

# The Northland Newton Development

Newton, Massachusetts

## Appendices

### PREPARED FOR

Northland Investment Corporation  
2150 Washington Street  
Newton, MA 02462

### PREPARED BY

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101 Walnut Street  
PO Box 9151  
Watertown, MA 02471  
617.924.1770

October 2018





# Appendices

- **Appendix A**
  - › Transportation Impact and Access Study
- **Appendix B**
  - › Parking





# Appendix A

- Traffic Volume Count Data
- Seasonal Adjustment Factors
- MassDOT Roadway Design Plans
- Public Transportation
- Vehicular Crash Data
- Planned/Approved Project-Generated Traffic Volumes
- Trip Generation Projections
- Mode Share Data
- Trip Distribution Calculation Worksheets
- Site-Generated Traffic Volume Networks
- Sight Distance Worksheets
- Intersection Capacity Analyses – With Robust Shuttle Service
- Intersection Capacity Analyses – With Existing Mode Share
- Mitigation Intersection Capacity Analyses – With Robust Shuttle Service
- Mitigation Intersection Capacity Analyses – With Existing Mode Share





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## Traffic Volume Count Data



## Volume Report

**Job** 12239.00\_VHB\_Loc\_1  
**Area** Newton, MA  
**Location** Oak Street, west of Needham Street

**BOSTON**  
**TRAFFIC DATA**

PO BOX 1723, Framingham, MA 01701  
 Office: 978-746-1259  
 DataRequest@BostonTrafficData.com  
 www.BostonTrafficData.com

Wednesday, October 25, 2017

| Time         | Total | EB          | WB          |             | Time | Total | EB  | WB  |
|--------------|-------|-------------|-------------|-------------|------|-------|-----|-----|
| 0000         | 9     | 4           | 5           |             | 1200 | 170   | 91  | 79  |
| 0015         | 10    | 7           | 3           |             | 1215 | 169   | 85  | 84  |
| 0030         | 6     | 3           | 3           |             | 1230 | 166   | 93  | 73  |
| 0045         | 3     | 0           | 3           | 14          | 1245 | 179   | 94  | 85  |
| 0100         | 6     | 3           | 3           | 14          | 1300 | 183   | 96  | 87  |
| 0115         | 0     | 0           | 0           |             | 1315 | 164   | 91  | 73  |
| 0130         | 3     | 1           | 2           |             | 1330 | 168   | 97  | 71  |
| 0145         | 4     | 3           | 1           | 6           | 1345 | 157   | 78  | 79  |
| 0200         | 2     | 0           | 2           |             | 1400 | 168   | 88  | 80  |
| 0215         | 1     | 1           | 0           |             | 1415 | 183   | 104 | 79  |
| 0230         | 1     | 0           | 1           |             | 1430 | 180   | 97  | 83  |
| 0245         | 2     | 0           | 2           | 5           | 1445 | 201   | 113 | 88  |
| 0300         | 4     | 3           | 1           |             | 1500 | 180   | 101 | 79  |
| 0315         | 1     | 0           | 1           |             | 1515 | 222   | 124 | 98  |
| 0330         | 3     | 1           | 2           |             | 1530 | 208   | 100 | 108 |
| 0345         | 4     | 2           | 2           | 6           | 1545 | 188   | 101 | 87  |
| 0400         | 3     | 1           | 2           |             | 1600 | 190   | 109 | 81  |
| 0415         | 8     | 6           | 2           |             | 1615 | 171   | 79  | 92  |
| 0430         | 6     | 5           | 1           |             | 1630 | 216   | 119 | 97  |
| 0445         | 12    | 6           | 6           | 11          | 1645 | 180   | 86  | 94  |
| 0500         | 12    | 6           | 6           |             | 1700 | 213   | 102 | 111 |
| 0515         | 10    | 8           | 2           |             | 1715 | 159   | 74  | 85  |
| 0530         | 18    | 12          | 6           |             | 1730 | 198   | 96  | 102 |
| 0545         | 24    | 14          | 10          | 24          | 1745 | 166   | 77  | 89  |
| 0600         | 28    | 11          | 17          |             | 1800 | 188   | 86  | 102 |
| 0615         | 35    | 23          | 12          |             | 1815 | 142   | 83  | 59  |
| 0630         | 58    | 37          | 21          |             | 1830 | 171   | 88  | 83  |
| 0645         | 67    | 33          | 34          | 84          | 1845 | 161   | 89  | 72  |
| 0700         | 94    | 63          | 31          |             | 1900 | 135   | 67  | 68  |
| 0715         | 144   | 84          | 60          |             | 1915 | 113   | 50  | 63  |
| 0730         | 151   | 74          | 77          |             | 1930 | 106   | 41  | 65  |
| 0745         | 187   | 74          | 113         | 281         | 1945 | 96    | 50  | 46  |
| 0800         | 207   | 104         | 103         |             | 2000 | 92    | 51  | 41  |
| 0815         | 184   | 67          | 117         |             | 2015 | 71    | 24  | 47  |
| 0830         | 189   | 85          | 104         |             | 2030 | 70    | 28  | 42  |
| 0845         | 193   | 88          | 105         | 429         | 2045 | 53    | 20  | 33  |
| 0900         | 161   | 84          | 77          |             | 2100 | 53    | 25  | 28  |
| 0915         | 145   | 79          | 66          |             | 2115 | 50    | 22  | 28  |
| 0930         | 126   | 67          | 59          |             | 2130 | 56    | 19  | 37  |
| 0945         | 132   | 66          | 66          | 268         | 2145 | 32    | 15  | 17  |
| 1000         | 143   | 80          | 63          |             | 2200 | 33    | 13  | 20  |
| 1015         | 117   | 60          | 57          |             | 2215 | 28    | 11  | 17  |
| 1030         | 125   | 69          | 56          |             | 2230 | 22    | 13  | 9   |
| 1045         | 134   | 70          | 64          | 240         | 2245 | 24    | 11  | 13  |
| 1100         | 134   | 74          | 60          |             | 2300 | 15    | 7   | 8   |
| 1115         | 148   | 74          | 74          |             | 2315 | 7     | 5   | 2   |
| 1130         | 155   | 85          | 70          |             | 2330 | 9     | 4   | 5   |
| 1145         | 170   | 97          | 73          | 277         | 2345 | 10    | 4   | 6   |
| <b>Total</b> |       | <b>9495</b> | <b>4855</b> | <b>4640</b> |      |       |     |     |

# Volume Report

**Job** 12239.00\_VHB\_Loc\_1  
**Area** Newton, MA  
**Location** Oak Street, west of Needham Street

**BOSTON**  
**TRAFFIC DATA**  
 PO BOX 1723, Framingham, MA 01701  
 Office: 978-746-1259  
 DataRequest@BostonTrafficData.com  
 www.BostonTrafficData.com

**Thursday, October 26, 2017**

| Time         | Total       | EB          | WB          |     | Time | Total | EB  | WB  |
|--------------|-------------|-------------|-------------|-----|------|-------|-----|-----|
| 0000         | 5           | 3           | 2           |     | 1200 | 183   | 101 | 82  |
| 0015         | 2           | 0           | 2           |     | 1215 | 157   | 88  | 69  |
| 0030         | 4           | 2           | 2           |     | 1230 | 152   | 83  | 69  |
| 0045         | 5           | 4           | 1           | 7   | 1245 | 199   | 104 | 95  |
| 0100         | 2           | 1           | 1           |     | 1300 | 171   | 93  | 78  |
| 0115         | 6           | 5           | 1           |     | 1315 | 168   | 87  | 81  |
| 0130         | 2           | 0           | 2           |     | 1330 | 167   | 83  | 84  |
| 0145         | 3           | 2           | 1           | 5   | 1345 | 173   | 97  | 76  |
| 0200         | 1           | 1           | 0           |     | 1400 | 172   | 88  | 84  |
| 0215         | 0           | 0           | 0           |     | 1415 | 175   | 90  | 85  |
| 0230         | 2           | 0           | 2           |     | 1430 | 172   | 98  | 74  |
| 0245         | 1           | 1           | 0           | 2   | 1445 | 182   | 104 | 78  |
| 0300         | 3           | 2           | 1           |     | 1500 | 222   | 128 | 94  |
| 0315         | 0           | 0           | 0           |     | 1515 | 170   | 94  | 76  |
| 0330         | 1           | 1           | 0           |     | 1530 | 216   | 98  | 118 |
| 0345         | 2           | 1           | 1           | 2   | 1545 | 193   | 94  | 99  |
| 0400         | 2           | 1           | 1           |     | 1600 | 210   | 113 | 97  |
| 0415         | 3           | 2           | 1           |     | 1615 | 188   | 102 | 86  |
| 0430         | 2           | 2           | 0           |     | 1630 | 199   | 102 | 97  |
| 0445         | 10          | 8           | 2           | 4   | 1645 | 180   | 91  | 89  |
| 0500         | 12          | 7           | 5           |     | 1700 | 216   | 114 | 102 |
| 0515         | 12          | 7           | 5           |     | 1715 | 170   | 86  | 84  |
| 0530         | 15          | 9           | 6           |     | 1730 | 148   | 63  | 85  |
| 0545         | 21          | 11          | 10          | 26  | 1745 | 192   | 86  | 106 |
| 0600         | 32          | 17          | 15          |     | 1800 | 192   | 97  | 95  |
| 0615         | 55          | 32          | 23          |     | 1815 | 159   | 76  | 83  |
| 0630         | 57          | 24          | 33          |     | 1830 | 161   | 79  | 82  |
| 0645         | 84          | 47          | 37          | 108 | 1845 | 146   | 66  | 80  |
| 0700         | 98          | 64          | 34          |     | 1900 | 159   | 86  | 73  |
| 0715         | 120         | 70          | 50          |     | 1915 | 115   | 51  | 64  |
| 0730         | 176         | 94          | 82          |     | 1930 | 102   | 42  | 60  |
| 0745         | 176         | 88          | 88          | 254 | 1945 | 107   | 58  | 49  |
| 0800         | 206         | 103         | 103         |     | 2000 | 92    | 33  | 59  |
| 0815         | 200         | 87          | 113         |     | 2015 | 92    | 47  | 45  |
| 0830         | 189         | 84          | 105         |     | 2030 | 78    | 34  | 44  |
| 0845         | 191         | 101         | 90          | 411 | 2045 | 59    | 23  | 36  |
| 0900         | 173         | 104         | 69          |     | 2100 | 66    | 30  | 36  |
| 0915         | 146         | 79          | 67          |     | 2115 | 31    | 15  | 16  |
| 0930         | 136         | 75          | 61          |     | 2130 | 38    | 20  | 18  |
| 0945         | 155         | 66          | 89          | 286 | 2145 | 43    | 18  | 25  |
| 1000         | 124         | 71          | 53          |     | 2200 | 43    | 17  | 26  |
| 1015         | 152         | 92          | 60          |     | 2215 | 31    | 19  | 12  |
| 1030         | 125         | 56          | 69          |     | 2230 | 28    | 14  | 14  |
| 1045         | 123         | 64          | 59          | 241 | 2245 | 25    | 11  | 14  |
| 1100         | 154         | 91          | 63          |     | 2300 | 21    | 15  | 6   |
| 1115         | 166         | 90          | 76          |     | 2315 | 19    | 9   | 10  |
| 1130         | 161         | 87          | 74          |     | 2330 | 18    | 10  | 8   |
| 1145         | 178         | 105         | 73          | 286 | 2345 | 10    | 5   | 5   |
| <b>Total</b> | <b>9703</b> | <b>5023</b> | <b>4680</b> |     |      |       |     |     |

## Volume Report

**Job** 12239.00\_VHB\_Loc 2  
**Area** Newton, MA  
**Location** Needham Street, north of Oak Street

**BOSTON**  
**TRAFFIC DATA**  
 PO BOX 1723, Framingham, MA 01701  
 Office: 978-746-1259  
 DataRequest@BostonTrafficData.com  
 www.BostonTrafficData.com

**Saturday, October 28, 2017**

| Time         | Total        | NB          | SB          |     | Time | Total | NB  | SB  |
|--------------|--------------|-------------|-------------|-----|------|-------|-----|-----|
| 0000         | 94           | 27          | 67          |     | 1200 | 405   | 217 | 188 |
| 0015         | 72           | 22          | 50          |     | 1215 | 431   | 221 | 210 |
| 0030         | 35           | 13          | 22          |     | 1230 | 394   | 206 | 188 |
| 0045         | 29           | 10          | 19          | 158 | 1245 | 376   | 194 | 182 |
| 0100         | 23           | 9           | 14          |     | 1300 | 425   | 217 | 208 |
| 0115         | 23           | 6           | 17          |     | 1315 | 397   | 206 | 191 |
| 0130         | 19           | 8           | 11          |     | 1330 | 413   | 213 | 200 |
| 0145         | 14           | 9           | 5           | 47  | 1345 | 412   | 221 | 191 |
| 0200         | 13           | 7           | 6           |     | 1400 | 371   | 203 | 168 |
| 0215         | 10           | 7           | 3           |     | 1415 | 391   | 203 | 188 |
| 0230         | 12           | 2           | 10          |     | 1430 | 391   | 198 | 193 |
| 0245         | 11           | 8           | 3           | 22  | 1445 | 394   | 196 | 198 |
| 0300         | 9            | 5           | 4           |     | 1500 | 403   | 194 | 209 |
| 0315         | 7            | 5           | 2           |     | 1515 | 371   | 179 | 192 |
| 0330         | 6            | 1           | 5           |     | 1530 | 389   | 182 | 207 |
| 0345         | 8            | 1           | 7           | 18  | 1545 | 428   | 211 | 217 |
| 0400         | 10           | 4           | 6           |     | 1600 | 386   | 188 | 198 |
| 0415         | 8            | 7           | 1           |     | 1615 | 368   | 170 | 198 |
| 0430         | 9            | 3           | 6           |     | 1630 | 370   | 162 | 208 |
| 0445         | 15           | 7           | 8           | 21  | 1645 | 368   | 176 | 192 |
| 0500         | 14           | 8           | 6           |     | 1700 | 377   | 157 | 220 |
| 0515         | 16           | 9           | 7           |     | 1715 | 354   | 161 | 193 |
| 0530         | 22           | 11          | 11          |     | 1730 | 348   | 173 | 175 |
| 0545         | 31           | 18          | 13          | 37  | 1745 | 317   | 144 | 173 |
| 0600         | 42           | 21          | 21          |     | 1800 | 307   | 160 | 147 |
| 0615         | 49           | 29          | 20          |     | 1815 | 329   | 164 | 165 |
| 0630         | 57           | 32          | 25          |     | 1830 | 310   | 182 | 128 |
| 0645         | 75           | 44          | 31          | 97  | 1845 | 303   | 159 | 144 |
| 0700         | 71           | 38          | 33          |     | 1900 | 274   | 124 | 150 |
| 0715         | 97           | 53          | 44          |     | 1915 | 265   | 108 | 157 |
| 0730         | 132          | 70          | 62          |     | 1930 | 195   | 99  | 96  |
| 0745         | 138          | 74          | 64          | 203 | 1945 | 186   | 87  | 99  |
| 0800         | 154          | 79          | 75          |     | 2000 | 168   | 79  | 89  |
| 0815         | 166          | 83          | 83          |     | 2015 | 157   | 58  | 99  |
| 0830         | 245          | 150         | 95          |     | 2030 | 161   | 58  | 103 |
| 0845         | 286          | 159         | 127         | 380 | 2045 | 143   | 40  | 103 |
| 0900         | 240          | 136         | 104         |     | 2100 | 118   | 44  | 74  |
| 0915         | 287          | 161         | 126         |     | 2115 | 111   | 33  | 78  |
| 0930         | 338          | 196         | 142         |     | 2130 | 121   | 46  | 75  |
| 0945         | 390          | 234         | 156         | 528 | 2145 | 110   | 37  | 73  |
| 1000         | 385          | 200         | 185         |     | 2200 | 76    | 27  | 49  |
| 1015         | 392          | 214         | 178         |     | 2215 | 82    | 36  | 46  |
| 1030         | 372          | 170         | 202         |     | 2230 | 68    | 28  | 40  |
| 1045         | 408          | 201         | 207         | 772 | 2245 | 57    | 28  | 29  |
| 1100         | 447          | 236         | 211         |     | 2300 | 67    | 25  | 42  |
| 1115         | 410          | 201         | 209         |     | 2315 | 54    | 27  | 27  |
| 1130         | 424          | 216         | 208         |     | 2330 | 49    | 23  | 26  |
| 1145         | 400          | 194         | 206         | 834 | 2345 | 45    | 22  | 23  |
| <b>Total</b> | <b>19550</b> | <b>9684</b> | <b>9866</b> |     |      |       |     |     |





## Classification Report

Job # 12239.00\_VHB\_Loc\_1  
 Area Newton, MA  
 Location Oak Street, west of Needham Street  
 Direction Eastbound  
 Wednesday, October 25, 2017



| Time  | Total   | Class 1<br>Motorcycle | Class 2<br>Passenger Car | Class 3<br>Vans, Pick up Trucks | Class 4<br>Bus | Class 5<br>2 Axle 6 Tires | Class 6<br>3 Axle Unit | Class 7<br>4 Axles or more Unit | Class 8<br>3 or 4 Axle Trailer | Class 9<br>5 Axle Trailer | Class 10<br>6 Axle or more Trailer | Class 11<br>5 Axle or less Multi-Trailer | Class 12<br>6 Axle Multi-Trailer | Class 13<br>7 Axle or more Multi-Trailer |
|-------|---------|-----------------------|--------------------------|---------------------------------|----------------|---------------------------|------------------------|---------------------------------|--------------------------------|---------------------------|------------------------------------|------------------------------------------|----------------------------------|------------------------------------------|
| 0000  | 14      | 0                     | 14                       | 0                               | 0              | 0                         | 0                      | 0                               | 0                              | 0                         | 0                                  | 0                                        | 0                                | 0                                        |
| 0100  | 7       | 0                     | 6                        | 0                               | 0              | 1                         | 0                      | 0                               | 0                              | 0                         | 0                                  | 0                                        | 0                                | 0                                        |
| 0200  | 1       | 0                     | 0                        | 0                               | 0              | 0                         | 1                      | 0                               | 0                              | 0                         | 0                                  | 0                                        | 0                                | 0                                        |
| 0300  | 6       | 0                     | 4                        | 2                               | 0              | 0                         | 0                      | 0                               | 0                              | 0                         | 0                                  | 0                                        | 0                                | 0                                        |
| 0400  | 18      | 0                     | 13                       | 1                               | 0              | 4                         | 0                      | 0                               | 0                              | 0                         | 0                                  | 0                                        | 0                                | 0                                        |
| 0500  | 40      | 0                     | 31                       | 8                               | 0              | 1                         | 0                      | 0                               | 0                              | 0                         | 0                                  | 0                                        | 0                                | 0                                        |
| 0600  | 104     | 0                     | 91                       | 11                              | 0              | 2                         | 0                      | 0                               | 0                              | 0                         | 0                                  | 0                                        | 0                                | 0                                        |
| 0700  | 295     | 0                     | 259                      | 25                              | 5              | 4                         | 2                      | 0                               | 0                              | 0                         | 0                                  | 0                                        | 0                                | 0                                        |
| 0800  | 344     | 1                     | 317                      | 16                              | 4              | 2                         | 2                      | 2                               | 0                              | 0                         | 0                                  | 0                                        | 0                                | 0                                        |
| 0900  | 296     | 0                     | 267                      | 26                              | 0              | 3                         | 0                      | 0                               | 0                              | 0                         | 0                                  | 0                                        | 0                                | 0                                        |
| 1000  | 279     | 0                     | 238                      | 32                              | 3              | 6                         | 0                      | 0                               | 0                              | 0                         | 0                                  | 0                                        | 0                                | 0                                        |
| 1100  | 330     | 0                     | 278                      | 36                              | 2              | 6                         | 8                      | 0                               | 0                              | 0                         | 0                                  | 0                                        | 0                                | 0                                        |
| 1200  | 363     | 1                     | 324                      | 29                              | 3              | 4                         | 1                      | 1                               | 0                              | 0                         | 0                                  | 0                                        | 0                                | 0                                        |
| 1300  | 362     | 1                     | 328                      | 25                              | 3              | 3                         | 0                      | 1                               | 0                              | 1                         | 0                                  | 0                                        | 0                                | 0                                        |
| 1400  | 402     | 0                     | 363                      | 30                              | 1              | 5                         | 1                      | 2                               | 0                              | 0                         | 0                                  | 0                                        | 0                                | 0                                        |
| 1500  | 426     | 0                     | 395                      | 27                              | 1              | 0                         | 1                      | 2                               | 0                              | 0                         | 0                                  | 0                                        | 0                                | 0                                        |
| 1600  | 393     | 0                     | 368                      | 20                              | 3              | 1                         | 0                      | 1                               | 0                              | 0                         | 0                                  | 0                                        | 0                                | 0                                        |
| 1700  | 349     | 0                     | 331                      | 12                              | 1              | 1                         | 0                      | 4                               | 0                              | 0                         | 0                                  | 0                                        | 0                                | 0                                        |
| 1800  | 346     | 1                     | 325                      | 20                              | 0              | 0                         | 0                      | 0                               | 0                              | 0                         | 0                                  | 0                                        | 0                                | 0                                        |
| 1900  | 208     | 0                     | 195                      | 10                              | 1              | 2                         | 0                      | 0                               | 0                              | 0                         | 0                                  | 0                                        | 0                                | 0                                        |
| 2000  | 123     | 0                     | 116                      | 7                               | 0              | 0                         | 0                      | 0                               | 0                              | 0                         | 0                                  | 0                                        | 0                                | 0                                        |
| 2100  | 81      | 0                     | 79                       | 1                               | 1              | 0                         | 0                      | 0                               | 0                              | 0                         | 0                                  | 0                                        | 0                                | 0                                        |
| 2200  | 48      | 0                     | 45                       | 2                               | 1              | 0                         | 0                      | 0                               | 0                              | 0                         | 0                                  | 0                                        | 0                                | 0                                        |
| 2300  | 20      | 0                     | 19                       | 1                               | 0              | 0                         | 0                      | 0                               | 0                              | 0                         | 0                                  | 0                                        | 0                                | 0                                        |
| 00-00 | 4855    | 4                     | 4406                     | 341                             | 29             | 45                        | 16                     | 13                              | 0                              | 1                         | 0                                  | 0                                        | 0                                | 0                                        |
|       | 100.00% | 0.08%                 | 90.75%                   | 7.02%                           | 0.60%          | 0.93%                     | 0.33%                  | 0.27%                           | 0.00%                          | 0.02%                     | 0.00%                              | 0.00%                                    | 0.00%                            | 0.00%                                    |

## Classification Report

**Job #** 12239.00\_VHB\_Loc\_1  
**Area** Newton, MA  
**Location** Oak Street, west of Needham Street  
**Direction** Eastbound  
**Thursday, October 26, 2017**



| Time  | Total   | Class 1<br>Motorcycle | Class 2<br>Passenger Car | Class 3<br>Vans, Pick up Trucks | Class 4<br>Bus | Class 5<br>2 Axle 6 Tires | Class 6<br>3 Axle Unit | Class 7<br>4 Axles or more Unit | Class 8<br>3 or 4 Axle Trailer | Class 9<br>5 Axle Trailer | Class 10<br>6 Axle or more Trailer | Class 11<br>5 Axle or less Multi-Trailer | Class 12<br>6 Axle Multi-Trailer | Class 13<br>7 Axle or more Multi-Trailer |
|-------|---------|-----------------------|--------------------------|---------------------------------|----------------|---------------------------|------------------------|---------------------------------|--------------------------------|---------------------------|------------------------------------|------------------------------------------|----------------------------------|------------------------------------------|
| 0000  | 9       | 0                     | 9                        | 0                               | 0              | 0                         | 0                      | 0                               | 0                              | 0                         | 0                                  | 0                                        | 0                                | 0                                        |
| 0100  | 8       | 0                     | 8                        | 0                               | 0              | 0                         | 0                      | 0                               | 0                              | 0                         | 0                                  | 0                                        | 0                                | 0                                        |
| 0200  | 2       | 0                     | 1                        | 1                               | 0              | 0                         | 0                      | 0                               | 0                              | 0                         | 0                                  | 0                                        | 0                                | 0                                        |
| 0300  | 4       | 0                     | 4                        | 0                               | 0              | 0                         | 0                      | 0                               | 0                              | 0                         | 0                                  | 0                                        | 0                                | 0                                        |
| 0400  | 13      | 0                     | 9                        | 4                               | 0              | 0                         | 0                      | 0                               | 0                              | 0                         | 0                                  | 0                                        | 0                                | 0                                        |
| 0500  | 34      | 0                     | 28                       | 4                               | 0              | 1                         | 1                      | 0                               | 0                              | 0                         | 0                                  | 0                                        | 0                                | 0                                        |
| 0600  | 120     | 0                     | 98                       | 19                              | 1              | 2                         | 0                      | 0                               | 0                              | 0                         | 0                                  | 0                                        | 0                                | 0                                        |
| 0700  | 316     | 0                     | 267                      | 39                              | 4              | 4                         | 2                      | 0                               | 0                              | 0                         | 0                                  | 0                                        | 0                                | 0                                        |
| 0800  | 375     | 2                     | 343                      | 23                              | 2              | 4                         | 1                      | 0                               | 0                              | 0                         | 0                                  | 0                                        | 0                                | 0                                        |
| 0900  | 324     | 0                     | 285                      | 33                              | 1              | 3                         | 2                      | 0                               | 0                              | 0                         | 0                                  | 0                                        | 0                                | 0                                        |
| 1000  | 283     | 1                     | 246                      | 27                              | 2              | 5                         | 1                      | 1                               | 0                              | 0                         | 0                                  | 0                                        | 0                                | 0                                        |
| 1100  | 373     | 0                     | 335                      | 31                              | 3              | 3                         | 0                      | 0                               | 0                              | 1                         | 0                                  | 0                                        | 0                                | 0                                        |
| 1200  | 376     | 0                     | 355                      | 18                              | 0              | 2                         | 1                      | 0                               | 0                              | 0                         | 0                                  | 0                                        | 0                                | 0                                        |
| 1300  | 360     | 1                     | 325                      | 23                              | 4              | 5                         | 0                      | 2                               | 0                              | 0                         | 0                                  | 0                                        | 0                                | 0                                        |
| 1400  | 380     | 0                     | 335                      | 34                              | 3              | 4                         | 2                      | 2                               | 0                              | 0                         | 0                                  | 0                                        | 0                                | 0                                        |
| 1500  | 414     | 0                     | 379                      | 30                              | 4              | 0                         | 0                      | 1                               | 0                              | 0                         | 0                                  | 0                                        | 0                                | 0                                        |
| 1600  | 408     | 1                     | 378                      | 26                              | 1              | 2                         | 0                      | 0                               | 0                              | 0                         | 0                                  | 0                                        | 0                                | 0                                        |
| 1700  | 349     | 1                     | 330                      | 13                              | 0              | 0                         | 1                      | 2                               | 0                              | 1                         | 0                                  | 0                                        | 0                                | 1                                        |
| 1800  | 318     | 1                     | 303                      | 14                              | 0              | 0                         | 0                      | 0                               | 0                              | 0                         | 0                                  | 0                                        | 0                                | 0                                        |
| 1900  | 237     | 0                     | 221                      | 12                              | 1              | 3                         | 0                      | 0                               | 0                              | 0                         | 0                                  | 0                                        | 0                                | 0                                        |
| 2000  | 137     | 0                     | 131                      | 6                               | 0              | 0                         | 0                      | 0                               | 0                              | 0                         | 0                                  | 0                                        | 0                                | 0                                        |
| 2100  | 83      | 0                     | 80                       | 3                               | 0              | 0                         | 0                      | 0                               | 0                              | 0                         | 0                                  | 0                                        | 0                                | 0                                        |
| 2200  | 61      | 0                     | 59                       | 2                               | 0              | 0                         | 0                      | 0                               | 0                              | 0                         | 0                                  | 0                                        | 0                                | 0                                        |
| 2300  | 39      | 0                     | 37                       | 2                               | 0              | 0                         | 0                      | 0                               | 0                              | 0                         | 0                                  | 0                                        | 0                                | 0                                        |
| 00-00 | 5023    | 7                     | 4566                     | 364                             | 26             | 38                        | 11                     | 8                               | 0                              | 2                         | 0                                  | 0                                        | 0                                | 1                                        |
|       | 100.00% | 0.14%                 | 90.90%                   | 7.25%                           | 0.52%          | 0.76%                     | 0.22%                  | 0.16%                           | 0.00%                          | 0.04%                     | 0.00%                              | 0.00%                                    | 0.00%                            | 0.02%                                    |

## Classification Report

Job # 12239.00\_VHB\_Loc\_1  
 Area Newton, MA  
 Location Oak Street, west of Needham Street  
 Direction Westbound  
 Wednesday, October 25, 2017

**BOSTON**  
**TRAFFIC DATA**  

 PO BOX 1723, Framingham, MA 01701  
 Office: 978-746-1259  
 DataInquiries@BostonTrafficData.com  
 www.BostonTrafficData.com

| Time  | Total   | Class 1<br>Motorcycle | Class 2<br>Passenger Car | Class 3<br>Vans, Pick up Trucks | Class 4<br>Bus | Class 5<br>2 Axle 6 Tires | Class 6<br>3 Axle Unit | Class 7<br>4 Axles or more Unit | Class 8<br>3 or 4 Axle Trailer | Class 9<br>5 Axle Trailer | Class 10<br>6 Axle or more Trailer | Class 11<br>5 Axle or less Multi-Trailer | Class 12<br>6 Axle Multi-Trailer | Class 13<br>7 Axle or more Multi-Trailer |
|-------|---------|-----------------------|--------------------------|---------------------------------|----------------|---------------------------|------------------------|---------------------------------|--------------------------------|---------------------------|------------------------------------|------------------------------------------|----------------------------------|------------------------------------------|
| 0000  | 14      | 1                     | 12                       | 1                               | 0              | 0                         | 0                      | 0                               | 0                              | 0                         | 0                                  | 0                                        | 0                                | 0                                        |
| 0100  | 6       | 0                     | 5                        | 1                               | 0              | 0                         | 0                      | 0                               | 0                              | 0                         | 0                                  | 0                                        | 0                                | 0                                        |
| 0200  | 5       | 0                     | 4                        | 1                               | 0              | 0                         | 0                      | 0                               | 0                              | 0                         | 0                                  | 0                                        | 0                                | 0                                        |
| 0300  | 6       | 0                     | 4                        | 1                               | 0              | 0                         | 1                      | 0                               | 0                              | 0                         | 0                                  | 0                                        | 0                                | 0                                        |
| 0400  | 11      | 0                     | 6                        | 4                               | 0              | 1                         | 0                      | 0                               | 0                              | 0                         | 0                                  | 0                                        | 0                                | 0                                        |
| 0500  | 24      | 1                     | 11                       | 6                               | 0              | 4                         | 2                      | 0                               | 0                              | 0                         | 0                                  | 0                                        | 0                                | 0                                        |
| 0600  | 84      | 0                     | 60                       | 18                              | 2              | 4                         | 0                      | 0                               | 0                              | 0                         | 0                                  | 0                                        | 0                                | 0                                        |
| 0700  | 281     | 1                     | 235                      | 32                              | 7              | 4                         | 2                      | 0                               | 0                              | 0                         | 0                                  | 0                                        | 0                                | 0                                        |
| 0800  | 429     | 1                     | 368                      | 47                              | 6              | 5                         | 1                      | 1                               | 0                              | 0                         | 0                                  | 0                                        | 0                                | 0                                        |
| 0900  | 268     | 0                     | 225                      | 33                              | 2              | 7                         | 0                      | 1                               | 0                              | 0                         | 0                                  | 0                                        | 0                                | 0                                        |
| 1000  | 240     | 1                     | 191                      | 37                              | 2              | 7                         | 1                      | 0                               | 0                              | 1                         | 0                                  | 0                                        | 0                                | 0                                        |
| 1100  | 277     | 0                     | 229                      | 36                              | 0              | 11                        | 1                      | 0                               | 0                              | 0                         | 0                                  | 0                                        | 0                                | 0                                        |
| 1200  | 321     | 1                     | 266                      | 38                              | 7              | 8                         | 1                      | 0                               | 0                              | 0                         | 0                                  | 0                                        | 0                                | 0                                        |
| 1300  | 310     | 0                     | 270                      | 25                              | 4              | 9                         | 1                      | 1                               | 0                              | 0                         | 0                                  | 0                                        | 0                                | 0                                        |
| 1400  | 330     | 0                     | 285                      | 35                              | 2              | 6                         | 0                      | 2                               | 0                              | 0                         | 0                                  | 0                                        | 0                                | 0                                        |
| 1500  | 372     | 0                     | 316                      | 48                              | 7              | 1                         | 0                      | 0                               | 0                              | 0                         | 0                                  | 0                                        | 0                                | 0                                        |
| 1600  | 364     | 0                     | 325                      | 28                              | 5              | 6                         | 0                      | 0                               | 0                              | 0                         | 0                                  | 0                                        | 0                                | 0                                        |
| 1700  | 387     | 1                     | 348                      | 32                              | 2              | 3                         | 0                      | 1                               | 0                              | 0                         | 0                                  | 0                                        | 0                                | 0                                        |
| 1800  | 316     | 1                     | 286                      | 26                              | 1              | 1                         | 0                      | 1                               | 0                              | 0                         | 0                                  | 0                                        | 0                                | 0                                        |
| 1900  | 242     | 0                     | 231                      | 10                              | 0              | 1                         | 0                      | 0                               | 0                              | 0                         | 0                                  | 0                                        | 0                                | 0                                        |
| 2000  | 163     | 0                     | 151                      | 10                              | 0              | 2                         | 0                      | 0                               | 0                              | 0                         | 0                                  | 0                                        | 0                                | 0                                        |
| 2100  | 110     | 0                     | 105                      | 5                               | 0              | 0                         | 0                      | 0                               | 0                              | 0                         | 0                                  | 0                                        | 0                                | 0                                        |
| 2200  | 59      | 0                     | 52                       | 4                               | 1              | 2                         | 0                      | 0                               | 0                              | 0                         | 0                                  | 0                                        | 0                                | 0                                        |
| 2300  | 21      | 0                     | 19                       | 2                               | 0              | 0                         | 0                      | 0                               | 0                              | 0                         | 0                                  | 0                                        | 0                                | 0                                        |
| 00-00 | 4640    | 8                     | 4004                     | 480                             | 48             | 82                        | 10                     | 7                               | 0                              | 1                         | 0                                  | 0                                        | 0                                | 0                                        |
|       | 100.00% | 0.17%                 | 86.29%                   | 10.34%                          | 1.03%          | 1.77%                     | 0.22%                  | 0.15%                           | 0.00%                          | 0.02%                     | 0.00%                              | 0.00%                                    | 0.00%                            | 0.00%                                    |

## Classification Report

**Job #** 12239.00\_VHB\_Loc\_1  
**Area** Newton, MA  
**Location** Oak Street, west of Needham Street  
**Direction** Westbound  
**Thursday, October 26, 2017**

**BOSTON**  
**TRAFFIC DATA**  
PO BOX 1723, Framingham, MA 01701  
 Office: 978-746-1259  
 DataInquiries@BostonTrafficData.com  
 www.BostonTrafficData.com

| Time  | Total   | Class 1<br>Motorcycle | Class 2<br>Passenger Car | Class 3<br>Vans, Pick up Trucks | Class 4<br>Bus | Class 5<br>2 Axle 6 Tires | Class 6<br>3 Axle Unit | Class 7<br>4 Axles or more Unit | Class 8<br>3 or 4 Axle Trailer | Class 9<br>5 Axle Trailer | Class 10<br>6 Axle or more Trailer | Class 11<br>5 Axle or less Multi-Trailer | Class 12<br>6 Axle Multi-Trailer | Class 13<br>7 Axle or more Multi-Trailer |
|-------|---------|-----------------------|--------------------------|---------------------------------|----------------|---------------------------|------------------------|---------------------------------|--------------------------------|---------------------------|------------------------------------|------------------------------------------|----------------------------------|------------------------------------------|
| 0000  | 7       | 0                     | 7                        | 0                               | 0              | 0                         | 0                      | 0                               | 0                              | 0                         | 0                                  | 0                                        | 0                                | 0                                        |
| 0100  | 5       | 0                     | 4                        | 1                               | 0              | 0                         | 0                      | 0                               | 0                              | 0                         | 0                                  | 0                                        | 0                                | 0                                        |
| 0200  | 2       | 0                     | 2                        | 0                               | 0              | 0                         | 0                      | 0                               | 0                              | 0                         | 0                                  | 0                                        | 0                                | 0                                        |
| 0300  | 2       | 0                     | 2                        | 0                               | 0              | 0                         | 0                      | 0                               | 0                              | 0                         | 0                                  | 0                                        | 0                                | 0                                        |
| 0400  | 4       | 0                     | 2                        | 2                               | 0              | 0                         | 0                      | 0                               | 0                              | 0                         | 0                                  | 0                                        | 0                                | 0                                        |
| 0500  | 26      | 0                     | 17                       | 3                               | 1              | 3                         | 2                      | 0                               | 0                              | 0                         | 0                                  | 0                                        | 0                                | 0                                        |
| 0600  | 108     | 0                     | 81                       | 23                              | 3              | 1                         | 0                      | 0                               | 0                              | 0                         | 0                                  | 0                                        | 0                                | 0                                        |
| 0700  | 254     | 0                     | 201                      | 43                              | 7              | 3                         | 0                      | 0                               | 0                              | 0                         | 0                                  | 0                                        | 0                                | 0                                        |
| 0800  | 411     | 1                     | 347                      | 48                              | 7              | 6                         | 0                      | 1                               | 0                              | 1                         | 0                                  | 0                                        | 0                                | 0                                        |
| 0900  | 286     | 2                     | 229                      | 43                              | 2              | 9                         | 1                      | 0                               | 0                              | 0                         | 0                                  | 0                                        | 0                                | 0                                        |
| 1000  | 241     | 0                     | 199                      | 35                              | 2              | 3                         | 2                      | 0                               | 0                              | 0                         | 0                                  | 0                                        | 0                                | 0                                        |
| 1100  | 286     | 0                     | 247                      | 32                              | 1              | 4                         | 2                      | 0                               | 0                              | 0                         | 0                                  | 0                                        | 0                                | 0                                        |
| 1200  | 315     | 0                     | 267                      | 39                              | 2              | 7                         | 0                      | 0                               | 0                              | 0                         | 0                                  | 0                                        | 0                                | 0                                        |
| 1300  | 319     | 0                     | 285                      | 27                              | 3              | 4                         | 0                      | 0                               | 0                              | 0                         | 0                                  | 0                                        | 0                                | 0                                        |
| 1400  | 321     | 0                     | 262                      | 42                              | 2              | 12                        | 2                      | 1                               | 0                              | 0                         | 0                                  | 0                                        | 0                                | 0                                        |
| 1500  | 387     | 0                     | 336                      | 45                              | 4              | 2                         | 0                      | 0                               | 0                              | 0                         | 0                                  | 0                                        | 0                                | 0                                        |
| 1600  | 369     | 0                     | 338                      | 26                              | 3              | 2                         | 0                      | 0                               | 0                              | 0                         | 0                                  | 0                                        | 0                                | 0                                        |
| 1700  | 377     | 0                     | 354                      | 21                              | 0              | 0                         | 2                      | 0                               | 0                              | 0                         | 0                                  | 0                                        | 0                                | 0                                        |
| 1800  | 340     | 0                     | 307                      | 29                              | 1              | 2                         | 1                      | 0                               | 0                              | 0                         | 0                                  | 0                                        | 0                                | 0                                        |
| 1900  | 246     | 0                     | 227                      | 16                              | 1              | 1                         | 1                      | 0                               | 0                              | 0                         | 0                                  | 0                                        | 0                                | 0                                        |
| 2000  | 184     | 0                     | 176                      | 8                               | 0              | 0                         | 0                      | 0                               | 0                              | 0                         | 0                                  | 0                                        | 0                                | 0                                        |
| 2100  | 95      | 0                     | 87                       | 7                               | 0              | 1                         | 0                      | 0                               | 0                              | 0                         | 0                                  | 0                                        | 0                                | 0                                        |
| 2200  | 66      | 0                     | 57                       | 7                               | 0              | 2                         | 0                      | 0                               | 0                              | 0                         | 0                                  | 0                                        | 0                                | 0                                        |
| 2300  | 29      | 0                     | 23                       | 6                               | 0              | 0                         | 0                      | 0                               | 0                              | 0                         | 0                                  | 0                                        | 0                                | 0                                        |
| 00-00 | 4680    | 3                     | 4057                     | 503                             | 39             | 62                        | 13                     | 2                               | 0                              | 1                         | 0                                  | 0                                        | 0                                | 0                                        |
|       | 100.00% | 0.06%                 | 86.69%                   | 10.75%                          | 0.83%          | 1.32%                     | 0.28%                  | 0.04%                           | 0.00%                          | 0.02%                     | 0.00%                              | 0.00%                                    | 0.00%                            | 0.00%                                    |

## Classification Report

**Job #** 12239.00\_VHB\_Loc 2  
**Area** Newton, MA  
**Location** Needham Street, north of Oak Street  
**Direction** Northbound  
**Saturday, October 28, 2017**

**BOSTON**  
**TRAFFIC DATA**  

 PO BOX 1723, Framingham, MA 01701  
 Office: 978-746-1259  
 DataInquiries@BostonTrafficData.com  
 www.BostonTrafficData.com

| Time  | Total   | Class 1<br>Motorcycle | Class 2<br>Passenger Car | Class 3<br>Vans, Pick up Trucks | Class 4<br>Bus | Class 5<br>2 Axle 6 Tires | Class 6<br>3 Axle Unit | Class 7<br>4 Axles or more Unit | Class 8<br>3 or 4 Axle Trailer | Class 9<br>5 Axle Trailer | Class 10<br>6 Axle or more Trailer | Class 11<br>5 Axle or less Multi-Trailer | Class 12<br>6 Axle Multi-Trailer | Class 13<br>7 Axle or more Multi-Trailer |
|-------|---------|-----------------------|--------------------------|---------------------------------|----------------|---------------------------|------------------------|---------------------------------|--------------------------------|---------------------------|------------------------------------|------------------------------------------|----------------------------------|------------------------------------------|
| 0000  | 72      | 0                     | 69                       | 3                               | 0              | 0                         | 0                      | 0                               | 0                              | 0                         | 0                                  | 0                                        | 0                                | 0                                        |
| 0100  | 32      | 0                     | 31                       | 1                               | 0              | 0                         | 0                      | 0                               | 0                              | 0                         | 0                                  | 0                                        | 0                                | 0                                        |
| 0200  | 24      | 0                     | 18                       | 4                               | 1              | 0                         | 0                      | 0                               | 0                              | 1                         | 0                                  | 0                                        | 0                                | 0                                        |
| 0300  | 12      | 0                     | 10                       | 2                               | 0              | 0                         | 0                      | 0                               | 0                              | 0                         | 0                                  | 0                                        | 0                                | 0                                        |
| 0400  | 21      | 0                     | 20                       | 1                               | 0              | 0                         | 0                      | 0                               | 0                              | 0                         | 0                                  | 0                                        | 0                                | 0                                        |
| 0500  | 46      | 1                     | 32                       | 8                               | 0              | 0                         | 0                      | 0                               | 0                              | 5                         | 0                                  | 0                                        | 0                                | 0                                        |
| 0600  | 126     | 0                     | 98                       | 21                              | 3              | 2                         | 1                      | 1                               | 0                              | 0                         | 0                                  | 0                                        | 0                                | 0                                        |
| 0700  | 235     | 0                     | 194                      | 33                              | 0              | 3                         | 2                      | 0                               | 0                              | 2                         | 1                                  | 0                                        | 0                                | 0                                        |
| 0800  | 471     | 2                     | 432                      | 31                              | 1              | 3                         | 1                      | 0                               | 0                              | 1                         | 0                                  | 0                                        | 0                                | 0                                        |
| 0900  | 727     | 0                     | 688                      | 33                              | 2              | 1                         | 2                      | 1                               | 0                              | 0                         | 0                                  | 0                                        | 0                                | 0                                        |
| 1000  | 785     | 1                     | 745                      | 28                              | 1              | 6                         | 1                      | 1                               | 0                              | 0                         | 1                                  | 0                                        | 0                                | 1                                        |
| 1100  | 847     | 1                     | 820                      | 23                              | 0              | 2                         | 0                      | 1                               | 0                              | 0                         | 0                                  | 0                                        | 0                                | 0                                        |
| 1200  | 838     | 2                     | 800                      | 33                              | 1              | 1                         | 0                      | 0                               | 0                              | 0                         | 1                                  | 0                                        | 0                                | 0                                        |
| 1300  | 857     | 0                     | 826                      | 26                              | 2              | 1                         | 0                      | 1                               | 0                              | 0                         | 1                                  | 0                                        | 0                                | 0                                        |
| 1400  | 800     | 1                     | 764                      | 30                              | 0              | 2                         | 2                      | 1                               | 0                              | 0                         | 0                                  | 0                                        | 0                                | 0                                        |
| 1500  | 766     | 0                     | 741                      | 20                              | 0              | 3                         | 1                      | 1                               | 0                              | 0                         | 0                                  | 0                                        | 0                                | 0                                        |
| 1600  | 696     | 3                     | 669                      | 22                              | 0              | 1                         | 0                      | 1                               | 0                              | 0                         | 0                                  | 0                                        | 0                                | 0                                        |
| 1700  | 635     | 1                     | 616                      | 17                              | 0              | 1                         | 0                      | 0                               | 0                              | 0                         | 0                                  | 0                                        | 0                                | 0                                        |
| 1800  | 665     | 0                     | 641                      | 23                              | 0              | 1                         | 0                      | 0                               | 0                              | 0                         | 0                                  | 0                                        | 0                                | 0                                        |
| 1900  | 418     | 0                     | 398                      | 20                              | 0              | 0                         | 0                      | 0                               | 0                              | 0                         | 0                                  | 0                                        | 0                                | 0                                        |
| 2000  | 235     | 0                     | 220                      | 14                              | 1              | 0                         | 0                      | 0                               | 0                              | 0                         | 0                                  | 0                                        | 0                                | 0                                        |
| 2100  | 160     | 0                     | 152                      | 6                               | 0              | 1                         | 0                      | 1                               | 0                              | 0                         | 0                                  | 0                                        | 0                                | 0                                        |
| 2200  | 119     | 1                     | 114                      | 4                               | 0              | 0                         | 0                      | 0                               | 0                              | 0                         | 0                                  | 0                                        | 0                                | 0                                        |
| 2300  | 97      | 0                     | 91                       | 5                               | 0              | 1                         | 0                      | 0                               | 0                              | 0                         | 0                                  | 0                                        | 0                                | 0                                        |
| 00-00 | 9684    | 13                    | 9189                     | 408                             | 12             | 29                        | 10                     | 9                               | 0                              | 9                         | 4                                  | 0                                        | 0                                | 1                                        |
|       | 100.00% | 0.13%                 | 94.89%                   | 4.21%                           | 0.12%          | 0.30%                     | 0.10%                  | 0.09%                           | 0.00%                          | 0.09%                     | 0.04%                              | 0.00%                                    | 0.00%                            | 0.01%                                    |

## Classification Report

**Job #** 12239.00\_VHB\_Loc 2  
**Area** Newton, MA  
**Location** Needham Street, north of Oak Street  
**Direction** Southbound  
**Saturday, October 28, 2017**

**BOSTON**  
**TRAFFIC DATA**  
PO BOX 1723, Framingham, MA 01701  
 Office: 978-746-1259  
 DataInquiries@BostonTrafficData.com  
 www.BostonTrafficData.com

| Time  | Total   | Class 1<br>Motorcycle | Class 2<br>Passenger Car | Class 3<br>Vans, Pick up Trucks | Class 4<br>Bus | Class 5<br>2 Axle 6 Tires | Class 6<br>3 Axle Unit | Class 7<br>4 Axles or more Unit | Class 8<br>3 or 4 Axle Trailer | Class 9<br>5 Axle Trailer | Class 10<br>6 Axle or more Trailer | Class 11<br>5 Axle or less Multi-Trailer | Class 12<br>6 Axle Multi-Trailer | Class 13<br>7 Axle or more Multi-Trailer |
|-------|---------|-----------------------|--------------------------|---------------------------------|----------------|---------------------------|------------------------|---------------------------------|--------------------------------|---------------------------|------------------------------------|------------------------------------------|----------------------------------|------------------------------------------|
| 0000  | 158     | 1                     | 138                      | 12                              | 5              | 1                         | 0                      | 1                               | 0                              | 0                         | 0                                  | 0                                        | 0                                | 0                                        |
| 0100  | 47      | 0                     | 42                       | 3                               | 2              | 0                         | 0                      | 0                               | 0                              | 0                         | 0                                  | 0                                        | 0                                | 0                                        |
| 0200  | 22      | 0                     | 19                       | 2                               | 0              | 0                         | 0                      | 0                               | 0                              | 1                         | 0                                  | 0                                        | 0                                | 0                                        |
| 0300  | 18      | 0                     | 14                       | 0                               | 0              | 4                         | 0                      | 0                               | 0                              | 0                         | 0                                  | 0                                        | 0                                | 0                                        |
| 0400  | 21      | 0                     | 17                       | 3                               | 0              | 1                         | 0                      | 0                               | 0                              | 0                         | 0                                  | 0                                        | 0                                | 0                                        |
| 0500  | 37      | 0                     | 26                       | 6                               | 0              | 0                         | 1                      | 0                               | 0                              | 4                         | 0                                  | 0                                        | 0                                | 0                                        |
| 0600  | 97      | 0                     | 79                       | 15                              | 0              | 0                         | 1                      | 0                               | 0                              | 2                         | 0                                  | 0                                        | 0                                | 0                                        |
| 0700  | 203     | 1                     | 174                      | 20                              | 2              | 3                         | 1                      | 1                               | 0                              | 1                         | 0                                  | 0                                        | 0                                | 0                                        |
| 0800  | 380     | 0                     | 333                      | 39                              | 1              | 5                         | 1                      | 1                               | 0                              | 0                         | 0                                  | 0                                        | 0                                | 0                                        |
| 0900  | 528     | 2                     | 482                      | 41                              | 2              | 0                         | 0                      | 0                               | 0                              | 1                         | 0                                  | 0                                        | 0                                | 0                                        |
| 1000  | 772     | 0                     | 723                      | 43                              | 1              | 1                         | 1                      | 3                               | 0                              | 0                         | 0                                  | 0                                        | 0                                | 0                                        |
| 1100  | 834     | 0                     | 793                      | 25                              | 0              | 2                         | 4                      | 9                               | 0                              | 1                         | 0                                  | 0                                        | 0                                | 0                                        |
| 1200  | 768     | 3                     | 718                      | 29                              | 0              | 2                         | 6                      | 9                               | 0                              | 0                         | 1                                  | 0                                        | 0                                | 0                                        |
| 1300  | 790     | 2                     | 751                      | 23                              | 0              | 0                         | 6                      | 5                               | 0                              | 1                         | 0                                  | 0                                        | 0                                | 2                                        |
| 1400  | 747     | 2                     | 711                      | 29                              | 0              | 2                         | 1                      | 1                               | 0                              | 1                         | 0                                  | 0                                        | 0                                | 0                                        |
| 1500  | 825     | 3                     | 782                      | 26                              | 2              | 2                         | 4                      | 3                               | 0                              | 2                         | 0                                  | 0                                        | 0                                | 1                                        |
| 1600  | 796     | 2                     | 753                      | 32                              | 3              | 4                         | 0                      | 2                               | 0                              | 0                         | 0                                  | 0                                        | 0                                | 0                                        |
| 1700  | 761     | 3                     | 712                      | 38                              | 1              | 1                         | 5                      | 1                               | 0                              | 0                         | 0                                  | 0                                        | 0                                | 0                                        |
| 1800  | 584     | 1                     | 559                      | 23                              | 0              | 0                         | 0                      | 1                               | 0                              | 0                         | 0                                  | 0                                        | 0                                | 0                                        |
| 1900  | 502     | 0                     | 477                      | 24                              | 0              | 0                         | 0                      | 1                               | 0                              | 0                         | 0                                  | 0                                        | 0                                | 0                                        |
| 2000  | 394     | 0                     | 372                      | 20                              | 1              | 1                         | 0                      | 0                               | 0                              | 0                         | 0                                  | 0                                        | 0                                | 0                                        |
| 2100  | 300     | 0                     | 279                      | 20                              | 0              | 0                         | 1                      | 0                               | 0                              | 0                         | 0                                  | 0                                        | 0                                | 0                                        |
| 2200  | 164     | 1                     | 151                      | 10                              | 0              | 2                         | 0                      | 0                               | 0                              | 0                         | 0                                  | 0                                        | 0                                | 0                                        |
| 2300  | 118     | 0                     | 110                      | 7                               | 0              | 0                         | 0                      | 1                               | 0                              | 0                         | 0                                  | 0                                        | 0                                | 0                                        |
| 00-00 | 9866    | 21                    | 9215                     | 490                             | 20             | 31                        | 32                     | 39                              | 0                              | 14                        | 1                                  | 0                                        | 0                                | 3                                        |
|       | 100.00% | 0.21%                 | 93.40%                   | 4.97%                           | 0.20%          | 0.31%                     | 0.32%                  | 0.40%                           | 0.00%                          | 0.14%                     | 0.01%                              | 0.00%                                    | 0.00%                            | 0.03%                                    |

## Speed Report

Job 12239.00\_VHB\_Loc\_1  
 Area Newton, MA  
 Location Oak Street, west of Needham Street  
 Dir Eastbound  
**Wednesday, October 25, 2017**

**BOSTON**  
**TRAFFIC DATA**  
 PO BOX 1723, Framingham, MA 01701  
 Office: 978-746-1259  
 DataRequest@BostonTrafficData.com  
 www.BostonTrafficData.com

| Time  | Total   | Speed Bins(mph) |          |          |          |          |          |          |          |          |          |          |          |          |          |          |  |
|-------|---------|-----------------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|--|
|       |         | 5<br>10         | 10<br>15 | 15<br>20 | 20<br>25 | 25<br>30 | 30<br>35 | 35<br>40 | 40<br>45 | 45<br>50 | 50<br>55 | 55<br>60 | 60<br>65 | 65<br>70 | 70<br>75 | 75<br>80 |  |
| 0000  | 14      | 0               | 0        | 0        | 0        | 7        | 7        | 0        | 0        | 0        | 0        | 0        | 0        | 0        | 0        | 0        |  |
| 0100  | 7       | 0               | 0        | 0        | 1        | 4        | 2        | 0        | 0        | 0        | 0        | 0        | 0        | 0        | 0        | 0        |  |
| 0200  | 1       | 0               | 0        | 0        | 0        | 1        | 0        | 0        | 0        | 0        | 0        | 0        | 0        | 0        | 0        | 0        |  |
| 0300  | 6       | 0               | 0        | 0        | 1        | 3        | 1        | 0        | 0        | 1        | 0        | 0        | 0        | 0        | 0        | 0        |  |
| 0400  | 18      | 0               | 0        | 0        | 6        | 5        | 5        | 1        | 1        | 0        | 0        | 0        | 0        | 0        | 0        | 0        |  |
| 0500  | 40      | 0               | 0        | 2        | 3        | 16       | 16       | 1        | 1        | 1        | 0        | 0        | 0        | 0        | 0        | 0        |  |
| 0600  | 104     | 0               | 0        | 1        | 7        | 61       | 32       | 3        | 0        | 0        | 0        | 0        | 0        | 0        | 0        | 0        |  |
| 0700  | 295     | 0               | 1        | 25       | 97       | 115      | 53       | 4        | 0        | 0        | 0        | 0        | 0        | 0        | 0        | 0        |  |
| 0800  | 344     | 5               | 36       | 57       | 76       | 119      | 44       | 6        | 1        | 0        | 0        | 0        | 0        | 0        | 0        | 0        |  |
| 0900  | 296     | 0               | 1        | 14       | 56       | 144      | 74       | 7        | 0        | 0        | 0        | 0        | 0        | 0        | 0        | 0        |  |
| 1000  | 279     | 2               | 7        | 18       | 72       | 113      | 62       | 4        | 1        | 0        | 0        | 0        | 0        | 0        | 0        | 0        |  |
| 1100  | 330     | 1               | 4        | 18       | 89       | 165      | 48       | 5        | 0        | 0        | 0        | 0        | 0        | 0        | 0        | 0        |  |
| 1200  | 363     | 4               | 10       | 25       | 96       | 148      | 73       | 7        | 0        | 0        | 0        | 0        | 0        | 0        | 0        | 0        |  |
| 1300  | 362     | 1               | 12       | 25       | 104      | 170      | 48       | 2        | 0        | 0        | 0        | 0        | 0        | 0        | 0        | 0        |  |
| 1400  | 402     | 25              | 68       | 59       | 86       | 113      | 44       | 7        | 0        | 0        | 0        | 0        | 0        | 0        | 0        | 0        |  |
| 1500  | 426     | 4               | 91       | 67       | 130      | 114      | 19       | 1        | 0        | 0        | 0        | 0        | 0        | 0        | 0        | 0        |  |
| 1600  | 393     | 14              | 69       | 61       | 105      | 120      | 22       | 2        | 0        | 0        | 0        | 0        | 0        | 0        | 0        | 0        |  |
| 1700  | 349     | 37              | 127      | 62       | 66       | 47       | 10       | 0        | 0        | 0        | 0        | 0        | 0        | 0        | 0        | 0        |  |
| 1800  | 346     | 0               | 21       | 65       | 134      | 111      | 14       | 1        | 0        | 0        | 0        | 0        | 0        | 0        | 0        | 0        |  |
| 1900  | 208     | 0               | 2        | 27       | 44       | 92       | 36       | 7        | 0        | 0        | 0        | 0        | 0        | 0        | 0        | 0        |  |
| 2000  | 123     | 0               | 0        | 2        | 21       | 59       | 33       | 7        | 1        | 0        | 0        | 0        | 0        | 0        | 0        | 0        |  |
| 2100  | 81      | 0               | 0        | 0        | 17       | 39       | 20       | 3        | 2        | 0        | 0        | 0        | 0        | 0        | 0        | 0        |  |
| 2200  | 48      | 0               | 0        | 2        | 13       | 24       | 9        | 0        | 0        | 0        | 0        | 0        | 0        | 0        | 0        | 0        |  |
| 2300  | 20      | 0               | 0        | 0        | 2        | 7        | 10       | 1        | 0        | 0        | 0        | 0        | 0        | 0        | 0        | 0        |  |
| 00-00 | 4855    | 93              | 449      | 530      | 1226     | 1797     | 682      | 69       | 7        | 2        | 0        | 0        | 0        | 0        | 0        | 0        |  |
|       | 100.00% | 1.92%           | 9.25%    | 10.92%   | 25.25%   | 37.01%   | 14.05%   | 1.42%    | 0.14%    | 0.04%    | 0.00%    | 0.00%    | 0.00%    | 0.00%    | 0.00%    | 0.00%    |  |

Maximum = 47.8 mph, Minimum = 6.2 mph, Mean = 24.3 mph  
 85% Speed = 30.14 mph, 95% Speed = 32.77 mph, Median = 25.33 mph  
 10 mph Pace = 22 - 32, Number in Pace = 3103 (63.91%)  
 Variance = 38.94, Standard Deviation = 6.24 mph

## Speed Report

Job 12239.00\_VHB\_Loc\_1  
 Area Newton, MA  
 Location Oak Street, west of Needham Street  
 Dir Eastbound  
 Thursday, October 26, 2017

**BOSTON**  
**TRAFFIC DATA**  
 PO BOX 1723, Framingham, MA 01701  
 Office: 978-746-1259  
 DataRequest@BostonTrafficData.com  
 www.BostonTrafficData.com

| Time    | Total | Speed Bins(mph) |          |          |          |          |          |          |          |          |          |          |          |          |          |          |  |  |
|---------|-------|-----------------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|--|--|
|         |       | 5<br>10         | 10<br>15 | 15<br>20 | 20<br>25 | 25<br>30 | 30<br>35 | 35<br>40 | 40<br>45 | 45<br>50 | 50<br>55 | 55<br>60 | 60<br>65 | 65<br>70 | 70<br>75 | 75<br>80 |  |  |
| 0000    | 9     | 0               | 0        | 0        | 3        | 3        | 3        | 0        | 0        | 0        | 0        | 0        | 0        | 0        | 0        | 0        |  |  |
| 0100    | 8     | 0               | 0        | 0        | 1        | 4        | 2        | 1        | 0        | 0        | 0        | 0        | 0        | 0        | 0        | 0        |  |  |
| 0200    | 2     | 0               | 0        | 0        | 0        | 0        | 2        | 0        | 0        | 0        | 0        | 0        | 0        | 0        | 0        | 0        |  |  |
| 0300    | 4     | 0               | 0        | 1        | 0        | 2        | 1        | 0        | 0        | 0        | 0        | 0        | 0        | 0        | 0        | 0        |  |  |
| 0400    | 13    | 0               | 0        | 0        | 0        | 10       | 3        | 0        | 0        | 0        | 0        | 0        | 0        | 0        | 0        | 0        |  |  |
| 0500    | 34    | 0               | 0        | 1        | 4        | 16       | 13       | 0        | 0        | 0        | 0        | 0        | 0        | 0        | 0        | 0        |  |  |
| 0600    | 120   | 0               | 0        | 0        | 14       | 57       | 43       | 5        | 1        | 0        | 0        | 0        | 0        | 0        | 0        | 0        |  |  |
| 0700    | 316   | 0               | 1        | 16       | 75       | 155      | 65       | 4        | 0        | 0        | 0        | 0        | 0        | 0        | 0        | 0        |  |  |
| 0800    | 375   | 3               | 24       | 71       | 132      | 118      | 22       | 5        | 0        | 0        | 0        | 0        | 0        | 0        | 0        | 0        |  |  |
| 0900    | 324   | 0               | 0        | 12       | 82       | 164      | 64       | 2        | 0        | 0        | 0        | 0        | 0        | 0        | 0        | 0        |  |  |
| 1000    | 283   | 0               | 1        | 7        | 58       | 144      | 62       | 9        | 2        | 0        | 0        | 0        | 0        | 0        | 0        | 0        |  |  |
| 1100    | 373   | 6               | 37       | 22       | 73       | 163      | 63       | 9        | 0        | 0        | 0        | 0        | 0        | 0        | 0        | 0        |  |  |
| 1200    | 376   | 42              | 107      | 65       | 63       | 82       | 16       | 1        | 0        | 0        | 0        | 0        | 0        | 0        | 0        | 0        |  |  |
| 1300    | 360   | 13              | 45       | 44       | 110      | 99       | 47       | 2        | 0        | 0        | 0        | 0        | 0        | 0        | 0        | 0        |  |  |
| 1400    | 380   | 7               | 41       | 71       | 99       | 122      | 37       | 2        | 1        | 0        | 0        | 0        | 0        | 0        | 0        | 0        |  |  |
| 1500    | 414   | 29              | 97       | 74       | 81       | 107      | 23       | 3        | 0        | 0        | 0        | 0        | 0        | 0        | 0        | 0        |  |  |
| 1600    | 408   | 9               | 32       | 61       | 103      | 149      | 51       | 2        | 0        | 1        | 0        | 0        | 0        | 0        | 0        | 0        |  |  |
| 1700    | 349   | 81              | 133      | 35       | 56       | 39       | 4        | 1        | 0        | 0        | 0        | 0        | 0        | 0        | 0        | 0        |  |  |
| 1800    | 318   | 2               | 8        | 54       | 127      | 109      | 16       | 2        | 0        | 0        | 0        | 0        | 0        | 0        | 0        | 0        |  |  |
| 1900    | 237   | 0               | 1        | 13       | 79       | 112      | 28       | 4        | 0        | 0        | 0        | 0        | 0        | 0        | 0        | 0        |  |  |
| 2000    | 137   | 0               | 0        | 6        | 32       | 74       | 21       | 3        | 1        | 0        | 0        | 0        | 0        | 0        | 0        | 0        |  |  |
| 2100    | 83    | 0               | 0        | 1        | 16       | 35       | 23       | 7        | 1        | 0        | 0        | 0        | 0        | 0        | 0        | 0        |  |  |
| 2200    | 61    | 0               | 0        | 2        | 7        | 31       | 16       | 5        | 0        | 0        | 0        | 0        | 0        | 0        | 0        | 0        |  |  |
| 2300    | 39    | 0               | 1        | 0        | 4        | 15       | 11       | 6        | 1        | 1        | 0        | 0        | 0        | 0        | 0        | 0        |  |  |
| 00-00   | 5023  | 192             | 528      | 556      | 1219     | 1810     | 636      | 73       | 7        | 2        | 0        | 0        | 0        | 0        | 0        | 0        |  |  |
| 100.00% |       | 3.82%           | 10.51%   | 11.07%   | 24.27%   | 36.03%   | 12.66%   | 1.45%    | 0.14%    | 0.04%    | 0.00%    | 0.00%    | 0.00%    | 0.00%    | 0.00%    | 0.00%    |  |  |

Maximum = 49.3 mph, Minimum = 6.3 mph, Mean = 23.7 mph  
 85% Speed = 29.92 mph, 95% Speed = 32.54 mph, Median = 25.05 mph  
 10 mph Pace = 22 - 32, Number in Pace = 3106 (61.84%)  
 Variance = 44.50, Standard Deviation = 6.67 mph



## Speed Report

Job 12239.00\_VHB\_Loc\_1  
 Area Newton, MA  
 Location Oak Street, west of Needham Street  
 Dir Westbound  
**Wednesday, October 25, 2017**

**BOSTON**  
**TRAFFIC DATA**  
 PO BOX 1723, Framingham, MA 01701  
 Office: 978-746-1259  
 DataRequest@BostonTrafficData.com  
 www.BostonTrafficData.com

| Time    | Total | Speed Bins(mph) |          |          |          |          |          |          |          |          |          |          |          |          |          |          |  |  |
|---------|-------|-----------------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|--|--|
|         |       | 5<br>10         | 10<br>15 | 15<br>20 | 20<br>25 | 25<br>30 | 30<br>35 | 35<br>40 | 40<br>45 | 45<br>50 | 50<br>55 | 55<br>60 | 60<br>65 | 65<br>70 | 70<br>75 | 75<br>80 |  |  |
| 0000    | 14    | 0               | 2        | 4        | 1        | 3        | 4        | 0        | 0        | 0        | 0        | 0        | 0        | 0        | 0        | 0        |  |  |
| 0100    | 6     | 0               | 0        | 0        | 0        | 0        | 4        | 2        | 0        | 0        | 0        | 0        | 0        | 0        | 0        | 0        |  |  |
| 0200    | 5     | 0               | 0        | 2        | 1        | 0        | 1        | 1        | 0        | 0        | 0        | 0        | 0        | 0        | 0        | 0        |  |  |
| 0300    | 6     | 0               | 0        | 3        | 0        | 0        | 1        | 1        | 1        | 0        | 0        | 0        | 0        | 0        | 0        | 0        |  |  |
| 0400    | 11    | 0               | 0        | 1        | 0        | 4        | 2        | 1        | 3        | 0        | 0        | 0        | 0        | 0        | 0        | 0        |  |  |
| 0500    | 24    | 0               | 1        | 0        | 1        | 8        | 10       | 2        | 1        | 1        | 0        | 0        | 0        | 0        | 0        | 0        |  |  |
| 0600    | 84    | 0               | 5        | 7        | 18       | 28       | 20       | 6        | 0        | 0        | 0        | 0        | 0        | 0        | 0        | 0        |  |  |
| 0700    | 281   | 0               | 1        | 16       | 31       | 125      | 91       | 14       | 3        | 0        | 0        | 0        | 0        | 0        | 0        | 0        |  |  |
| 0800    | 429   | 0               | 3        | 16       | 79       | 172      | 132      | 24       | 3        | 0        | 0        | 0        | 0        | 0        | 0        | 0        |  |  |
| 0900    | 268   | 0               | 4        | 14       | 33       | 89       | 102      | 23       | 3        | 0        | 0        | 0        | 0        | 0        | 0        | 0        |  |  |
| 1000    | 240   | 0               | 5        | 15       | 27       | 77       | 85       | 31       | 0        | 0        | 0        | 0        | 0        | 0        | 0        | 0        |  |  |
| 1100    | 277   | 2               | 7        | 15       | 26       | 100      | 100      | 24       | 3        | 0        | 0        | 0        | 0        | 0        | 0        | 0        |  |  |
| 1200    | 321   | 1               | 4        | 7        | 31       | 117      | 122      | 33       | 5        | 1        | 0        | 0        | 0        | 0        | 0        | 0        |  |  |
| 1300    | 310   | 1               | 2        | 9        | 27       | 109      | 121      | 34       | 6        | 1        | 0        | 0        | 0        | 0        | 0        | 0        |  |  |
| 1400    | 330   | 1               | 1        | 14       | 35       | 102      | 132      | 41       | 3        | 1        | 0        | 0        | 0        | 0        | 0        | 0        |  |  |
| 1500    | 372   | 1               | 14       | 22       | 60       | 128      | 120      | 26       | 1        | 0        | 0        | 0        | 0        | 0        | 0        | 0        |  |  |
| 1600    | 364   | 1               | 4        | 15       | 36       | 168      | 124      | 16       | 0        | 0        | 0        | 0        | 0        | 0        | 0        | 0        |  |  |
| 1700    | 387   | 4               | 8        | 17       | 64       | 181      | 98       | 13       | 2        | 0        | 0        | 0        | 0        | 0        | 0        | 0        |  |  |
| 1800    | 316   | 0               | 12       | 35       | 72       | 135      | 55       | 7        | 0        | 0        | 0        | 0        | 0        | 0        | 0        | 0        |  |  |
| 1900    | 242   | 2               | 7        | 16       | 37       | 93       | 78       | 8        | 1        | 0        | 0        | 0        | 0        | 0        | 0        | 0        |  |  |
| 2000    | 163   | 0               | 2        | 9        | 20       | 64       | 55       | 9        | 4        | 0        | 0        | 0        | 0        | 0        | 0        | 0        |  |  |
| 2100    | 110   | 2               | 4        | 4        | 12       | 46       | 28       | 11       | 3        | 0        | 0        | 0        | 0        | 0        | 0        | 0        |  |  |
| 2200    | 59    | 0               | 1        | 4        | 12       | 18       | 18       | 4        | 2        | 0        | 0        | 0        | 0        | 0        | 0        | 0        |  |  |
| 2300    | 21    | 0               | 1        | 6        | 0        | 5        | 7        | 1        | 1        | 0        | 0        | 0        | 0        | 0        | 0        | 0        |  |  |
| 00-00   | 4640  | 15              | 88       | 251      | 623      | 1772     | 1510     | 332      | 45       | 4        | 0        | 0        | 0        | 0        | 0        | 0        |  |  |
| 100.00% |       | 0.32%           | 1.90%    | 5.41%    | 13.43%   | 38.19%   | 32.54%   | 7.16%    | 0.97%    | 0.09%    | 0.00%    | 0.00%    | 0.00%    | 0.00%    | 0.00%    | 0.00%    |  |  |

Maximum = 47.5 mph, Minimum = 7.4 mph, Mean = 28.4 mph  
 85% Speed = 33.55 mph, 95% Speed = 36.35 mph, Median = 28.86 mph  
 10 mph Pace = 25 - 35, Number in Pace = 3310 (71.34%)  
 Variance = 29.13, Standard Deviation = 5.40 mph

## Speed Report

Job 12239.00\_VHB\_Loc\_1  
 Area Newton, MA  
 Location Oak Street, west of Needham Street  
 Dir Westbound  
 Thursday, October 26, 2017

**BOSTON**  
**TRAFFIC DATA**  
 PO BOX 1723, Framingham, MA 01701  
 Office: 978-746-1259  
 DataRequest@BostonTrafficData.com  
 www.BostonTrafficData.com

| Time  | Total   | Speed Bins(mph) |          |          |          |          |          |          |          |          |          |          |          |          |          |          |  |  |
|-------|---------|-----------------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|--|--|
|       |         | 5<br>10         | 10<br>15 | 15<br>20 | 20<br>25 | 25<br>30 | 30<br>35 | 35<br>40 | 40<br>45 | 45<br>50 | 50<br>55 | 55<br>60 | 60<br>65 | 65<br>70 | 70<br>75 | 75<br>80 |  |  |
| 0000  | 7       | 0               | 0        | 0        | 0        | 1        | 6        | 0        | 0        | 0        | 0        | 0        | 0        | 0        | 0        | 0        |  |  |
| 0100  | 5       | 0               | 0        | 2        | 0        | 2        | 1        | 0        | 0        | 0        | 0        | 0        | 0        | 0        | 0        | 0        |  |  |
| 0200  | 2       | 0               | 0        | 0        | 0        | 0        | 1        | 0        | 1        | 0        | 0        | 0        | 0        | 0        | 0        | 0        |  |  |
| 0300  | 2       | 0               | 0        | 0        | 0        | 0        | 1        | 0        | 1        | 0        | 0        | 0        | 0        | 0        | 0        | 0        |  |  |
| 0400  | 4       | 0               | 0        | 1        | 0        | 2        | 1        | 0        | 0        | 0        | 0        | 0        | 0        | 0        | 0        | 0        |  |  |
| 0500  | 26      | 0               | 0        | 0        | 3        | 4        | 12       | 5        | 1        | 1        | 0        | 0        | 0        | 0        | 0        | 0        |  |  |
| 0600  | 108     | 0               | 0        | 7        | 13       | 31       | 37       | 14       | 6        | 0        | 0        | 0        | 0        | 0        | 0        | 0        |  |  |
| 0700  | 254     | 0               | 2        | 5        | 13       | 84       | 104      | 41       | 4        | 0        | 1        | 0        | 0        | 0        | 0        | 0        |  |  |
| 0800  | 411     | 0               | 5        | 14       | 50       | 194      | 124      | 21       | 2        | 1        | 0        | 0        | 0        | 0        | 0        | 0        |  |  |
| 0900  | 286     | 5               | 6        | 10       | 36       | 128      | 84       | 16       | 1        | 0        | 0        | 0        | 0        | 0        | 0        | 0        |  |  |
| 1000  | 241     | 0               | 4        | 14       | 24       | 90       | 78       | 24       | 6        | 1        | 0        | 0        | 0        | 0        | 0        | 0        |  |  |
| 1100  | 286     | 2               | 2        | 7        | 27       | 89       | 121      | 33       | 5        | 0        | 0        | 0        | 0        | 0        | 0        | 0        |  |  |
| 1200  | 315     | 1               | 3        | 5        | 21       | 112      | 130      | 37       | 6        | 0        | 0        | 0        | 0        | 0        | 0        | 0        |  |  |
| 1300  | 319     | 1               | 1        | 4        | 23       | 105      | 133      | 46       | 5        | 1        | 0        | 0        | 0        | 0        | 0        | 0        |  |  |
| 1400  | 321     | 0               | 2        | 7        | 35       | 122      | 122      | 30       | 1        | 2        | 0        | 0        | 0        | 0        | 0        | 0        |  |  |
| 1500  | 387     | 2               | 13       | 14       | 65       | 166      | 97       | 25       | 5        | 0        | 0        | 0        | 0        | 0        | 0        | 0        |  |  |
| 1600  | 369     | 1               | 10       | 36       | 73       | 148      | 87       | 14       | 0        | 0        | 0        | 0        | 0        | 0        | 0        | 0        |  |  |
| 1700  | 377     | 2               | 12       | 45       | 129      | 135      | 48       | 6        | 0        | 0        | 0        | 0        | 0        | 0        | 0        | 0        |  |  |
| 1800  | 340     | 4               | 8        | 26       | 103      | 134      | 57       | 8        | 0        | 0        | 0        | 0        | 0        | 0        | 0        | 0        |  |  |
| 1900  | 246     | 2               | 10       | 16       | 65       | 104      | 42       | 6        | 0        | 0        | 1        | 0        | 0        | 0        | 0        | 0        |  |  |
| 2000  | 184     | 0               | 8        | 12       | 60       | 52       | 40       | 11       | 1        | 0        | 0        | 0        | 0        | 0        | 0        | 0        |  |  |
| 2100  | 95      | 0               | 2        | 4        | 12       | 32       | 31       | 11       | 3        | 0        | 0        | 0        | 0        | 0        | 0        | 0        |  |  |
| 2200  | 66      | 0               | 1        | 11       | 9        | 16       | 11       | 14       | 3        | 1        | 0        | 0        | 0        | 0        | 0        | 0        |  |  |
| 2300  | 29      | 0               | 0        | 1        | 3        | 10       | 8        | 4        | 3        | 0        | 0        | 0        | 0        | 0        | 0        | 0        |  |  |
| 00-00 | 4680    | 20              | 89       | 241      | 764      | 1761     | 1376     | 366      | 54       | 7        | 2        | 0        | 0        | 0        | 0        | 0        |  |  |
|       | 100.00% | 0.43%           | 1.90%    | 5.15%    | 16.32%   | 37.63%   | 29.40%   | 7.82%    | 1.15%    | 0.15%    | 0.04%    | 0.00%    | 0.00%    | 0.00%    | 0.00%    | 0.00%    |  |  |

Maximum = 51.1 mph, Minimum = 6.4 mph, Mean = 28.3 mph  
 85% Speed = 33.55 mph, 95% Speed = 36.63 mph, Median = 28.74 mph  
 10 mph Pace = 24 - 34, Number in Pace = 3248 (69.40%)  
 Variance = 30.75, Standard Deviation = 5.55 mph

## Speed Report

Job 12239.00\_VHB\_Loc 2  
 Area Newton, MA  
 Location Needham Street, north of Oak Street  
 Dir Northbound  
**Saturday, October 28, 2017**

**BOSTON**  
**TRAFFIC DATA**  
 PO BOX 1723, Framingham, MA 01701  
 Office: 978-746-1259  
 DataRequest@BostonTrafficData.com  
 www.BostonTrafficData.com

| Time    | Total | Speed Bins(mph) |          |          |          |          |          |          |          |          |          |          |          |          |          |          |  |
|---------|-------|-----------------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|--|
|         |       | 5<br>10         | 10<br>15 | 15<br>20 | 20<br>25 | 25<br>30 | 30<br>35 | 35<br>40 | 40<br>45 | 45<br>50 | 50<br>55 | 55<br>60 | 60<br>65 | 65<br>70 | 70<br>75 | 75<br>80 |  |
| 0000    | 72    | 0               | 0        | 0        | 4        | 20       | 36       | 10       | 2        | 0        | 0        | 0        | 0        | 0        | 0        | 0        |  |
| 0100    | 32    | 0               | 0        | 0        | 0        | 5        | 17       | 10       | 0        | 0        | 0        | 0        | 0        | 0        | 0        | 0        |  |
| 0200    | 24    | 0               | 0        | 0        | 3        | 5        | 7        | 5        | 4        | 0        | 0        | 0        | 0        | 0        | 0        | 0        |  |
| 0300    | 12    | 0               | 0        | 0        | 1        | 2        | 6        | 1        | 2        | 0        | 0        | 0        | 0        | 0        | 0        | 0        |  |
| 0400    | 21    | 0               | 0        | 0        | 1        | 1        | 10       | 5        | 2        | 2        | 0        | 0        | 0        | 0        | 0        | 0        |  |
| 0500    | 46    | 0               | 0        | 2        | 4        | 12       | 13       | 8        | 6        | 1        | 0        | 0        | 0        | 0        | 0        | 0        |  |
| 0600    | 126   | 0               | 5        | 4        | 7        | 30       | 47       | 28       | 5        | 0        | 0        | 0        | 0        | 0        | 0        | 0        |  |
| 0700    | 235   | 0               | 17       | 6        | 26       | 68       | 90       | 22       | 5        | 1        | 0        | 0        | 0        | 0        | 0        | 0        |  |
| 0800    | 471   | 2               | 18       | 29       | 94       | 190      | 114      | 20       | 2        | 2        | 0        | 0        | 0        | 0        | 0        | 0        |  |
| 0900    | 727   | 2               | 58       | 117      | 253      | 215      | 72       | 10       | 0        | 0        | 0        | 0        | 0        | 0        | 0        | 0        |  |
| 1000    | 785   | 11              | 80       | 177      | 253      | 207      | 54       | 3        | 0        | 0        | 0        | 0        | 0        | 0        | 0        | 0        |  |
| 1100    | 847   | 16              | 102      | 236      | 320      | 150      | 23       | 0        | 0        | 0        | 0        | 0        | 0        | 0        | 0        | 0        |  |
| 1200    | 838   | 22              | 133      | 218      | 320      | 125      | 19       | 1        | 0        | 0        | 0        | 0        | 0        | 0        | 0        | 0        |  |
| 1300    | 857   | 28              | 160      | 272      | 279      | 101      | 17       | 0        | 0        | 0        | 0        | 0        | 0        | 0        | 0        | 0        |  |
| 1400    | 800   | 12              | 152      | 222      | 245      | 137      | 30       | 2        | 0        | 0        | 0        | 0        | 0        | 0        | 0        | 0        |  |
| 1500    | 766   | 11              | 89       | 219      | 256      | 161      | 25       | 4        | 0        | 0        | 0        | 0        | 0        | 0        | 0        | 0        |  |
| 1600    | 696   | 11              | 50       | 148      | 202      | 202      | 71       | 9        | 2        | 0        | 0        | 1        | 0        | 0        | 0        | 0        |  |
| 1700    | 635   | 7               | 35       | 119      | 268      | 154      | 48       | 4        | 0        | 0        | 0        | 0        | 0        | 0        | 0        | 0        |  |
| 1800    | 665   | 4               | 40       | 117      | 271      | 181      | 46       | 6        | 0        | 0        | 0        | 0        | 0        | 0        | 0        | 0        |  |
| 1900    | 418   | 0               | 19       | 44       | 125      | 146      | 69       | 14       | 1        | 0        | 0        | 0        | 0        | 0        | 0        | 0        |  |
| 2000    | 235   | 1               | 5        | 8        | 34       | 91       | 71       | 22       | 3        | 0        | 0        | 0        | 0        | 0        | 0        | 0        |  |
| 2100    | 160   | 0               | 4        | 2        | 15       | 42       | 67       | 27       | 2        | 1        | 0        | 0        | 0        | 0        | 0        | 0        |  |
| 2200    | 119   | 1               | 1        | 2        | 8        | 46       | 52       | 8        | 1        | 0        | 0        | 0        | 0        | 0        | 0        | 0        |  |
| 2300    | 97    | 0               | 5        | 2        | 0        | 24       | 43       | 19       | 4        | 0        | 0        | 0        | 0        | 0        | 0        | 0        |  |
| 00-00   | 9684  | 128             | 973      | 1944     | 2989     | 2315     | 1047     | 238      | 41       | 7        | 0        | 1        | 0        | 0        | 0        | 0        |  |
| 100.00% |       | 1.32%           | 10.05%   | 20.07%   | 30.87%   | 23.91%   | 10.81%   | 2.46%    | 0.42%    | 0.07%    | 0.00%    | 0.01%    | 0.00%    | 0.00%    | 0.00%    | 0.00%    |  |

Maximum = 96.5 mph, Minimum = 6.2 mph, Mean = 23.0 mph  
 85% Speed = 29.70 mph, 95% Speed = 33.55 mph, Median = 23.04 mph  
 10 mph Pace = 18 - 28, Number in Pace = 5535 (57.16%)  
 Variance = 40.83, Standard Deviation = 6.39 mph

## Speed Report

Job 12239.00\_VHB\_Loc 2  
 Area Newton, MA  
 Location Needham Street, north of Oak Street  
 Dir Southbound  
**Saturday, October 28, 2017**

**BOSTON**  
**TRAFFIC DATA**  
 PO BOX 1723, Framingham, MA 01701  
 Office: 978-746-1259  
 DataRequest@BostonTrafficData.com  
 www.BostonTrafficData.com

| Time    | Total | Speed Bins(mph) |          |          |          |          |          |          |          |          |          |          |          |          |          |          |  |  |
|---------|-------|-----------------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|--|--|
|         |       | 5<br>10         | 10<br>15 | 15<br>20 | 20<br>25 | 25<br>30 | 30<br>35 | 35<br>40 | 40<br>45 | 45<br>50 | 50<br>55 | 55<br>60 | 60<br>65 | 65<br>70 | 70<br>75 | 75<br>80 |  |  |
| 0000    | 158   | 0               | 0        | 4        | 6        | 25       | 72       | 41       | 7        | 2        | 0        | 0        | 1        | 0        | 0        | 0        |  |  |
| 0100    | 47    | 0               | 0        | 0        | 0        | 4        | 20       | 18       | 5        | 0        | 0        | 0        | 0        | 0        | 0        | 0        |  |  |
| 0200    | 22    | 0               | 0        | 0        | 1        | 4        | 7        | 5        | 3        | 2        | 0        | 0        | 0        | 0        | 0        | 0        |  |  |
| 0300    | 18    | 0               | 1        | 0        | 0        | 6        | 6        | 1        | 3        | 1        | 0        | 0        | 0        | 0        | 0        | 0        |  |  |
| 0400    | 21    | 0               | 0        | 0        | 0        | 3        | 9        | 7        | 2        | 0        | 0        | 0        | 0        | 0        | 0        | 0        |  |  |
| 0500    | 37    | 0               | 0        | 1        | 3        | 6        | 10       | 13       | 4        | 0        | 0        | 0        | 0        | 0        | 0        | 0        |  |  |
| 0600    | 97    | 0               | 2        | 3        | 8        | 16       | 35       | 28       | 5        | 0        | 0        | 0        | 0        | 0        | 0        | 0        |  |  |
| 0700    | 203   | 0               | 3        | 15       | 15       | 67       | 74       | 20       | 7        | 2        | 0        | 0        | 0        | 0        | 0        | 0        |  |  |
| 0800    | 380   | 1               | 4        | 22       | 48       | 144      | 125      | 29       | 6        | 1        | 0        | 0        | 0        | 0        | 0        | 0        |  |  |
| 0900    | 528   | 3               | 25       | 71       | 108      | 204      | 95       | 19       | 3        | 0        | 0        | 0        | 0        | 0        | 0        | 0        |  |  |
| 1000    | 772   | 38              | 160      | 239      | 186      | 115      | 27       | 7        | 0        | 0        | 0        | 0        | 0        | 0        | 0        | 0        |  |  |
| 1100    | 834   | 32              | 203      | 417      | 134      | 45       | 3        | 0        | 0        | 0        | 0        | 0        | 0        | 0        | 0        | 0        |  |  |
| 1200    | 768   | 61              | 319      | 271      | 104      | 10       | 3        | 0        | 0        | 0        | 0        | 0        | 0        | 0        | 0        | 0        |  |  |
| 1300    | 790   | 70              | 324      | 288      | 95       | 11       | 2        | 0        | 0        | 0        | 0        | 0        | 0        | 0        | 0        | 0        |  |  |
| 1400    | 747   | 38              | 281      | 278      | 123      | 23       | 2        | 2        | 0        | 0        | 0        | 0        | 0        | 0        | 0        | 0        |  |  |
| 1500    | 825   | 67              | 286      | 298      | 128      | 32       | 11       | 2        | 0        | 0        | 0        | 0        | 0        | 0        | 0        | 0        |  |  |
| 1600    | 796   | 44              | 213      | 285      | 148      | 90       | 13       | 3        | 0        | 0        | 0        | 0        | 0        | 0        | 0        | 0        |  |  |
| 1700    | 761   | 25              | 159      | 258      | 196      | 100      | 20       | 3        | 0        | 0        | 0        | 0        | 0        | 0        | 0        | 0        |  |  |
| 1800    | 584   | 0               | 28       | 101      | 180      | 211      | 60       | 3        | 1        | 0        | 0        | 0        | 0        | 0        | 0        | 0        |  |  |
| 1900    | 502   | 0               | 15       | 54       | 117      | 208      | 97       | 10       | 1        | 0        | 0        | 0        | 0        | 0        | 0        | 0        |  |  |
| 2000    | 394   | 0               | 2        | 37       | 61       | 158      | 104      | 30       | 2        | 0        | 0        | 0        | 0        | 0        | 0        | 0        |  |  |
| 2100    | 300   | 1               | 0        | 20       | 25       | 104      | 110      | 37       | 3        | 0        | 0        | 0        | 0        | 0        | 0        | 0        |  |  |
| 2200    | 164   | 0               | 0        | 2        | 4        | 45       | 64       | 41       | 6        | 2        | 0        | 0        | 0        | 0        | 0        | 0        |  |  |
| 2300    | 118   | 0               | 0        | 3        | 0        | 36       | 43       | 32       | 4        | 0        | 0        | 0        | 0        | 0        | 0        | 0        |  |  |
| 00-00   | 9866  | 380             | 2025     | 2667     | 1690     | 1667     | 1012     | 351      | 62       | 10       | 0        | 0        | 1        | 0        | 0        | 0        |  |  |
| 100.00% |       | 3.85%           | 20.53%   | 27.03%   | 17.13%   | 16.90%   | 10.26%   | 3.56%    | 0.63%    | 0.10%    | 0.00%    | 0.00%    | 0.01%    | 0.00%    | 0.00%    | 0.00%    |  |  |

Maximum = 96.5 mph, Minimum = 6.2 mph, Mean = 21.1 mph  
 85% Speed = 29.86 mph, 95% Speed = 34.45 mph, Median = 19.69 mph  
 10 mph Pace = 12 - 22, Number in Pace = 4855 (49.21%)  
 Variance = 58.18, Standard Deviation = 7.63 mph

Client: Matt Duranleau  
Project #: 12239.00\_127\_018\_VHb  
BTD #: Location 1  
Location: Newton, MA  
Street 1: Chestnut Street / Boylston Street  
Street 2: Route 9 WB Service Road  
Count Date: 10/26/2017  
Day of Week: Thursday  
Weather: Rainy, 55°F



**TOTAL (CARS & TRUCKS)**

| Start Time | Chestnut Street Northbound |      |      | Chestnut Street Southbound |        |      | Boylston Street Eastbound |       |        | Route 9 WB Service Road (Boylston Street) Westbound |      |       |
|------------|----------------------------|------|------|----------------------------|--------|------|---------------------------|-------|--------|-----------------------------------------------------|------|-------|
|            | U-Turn                     | Left | Thru | Right                      | U-Turn | Left | Thru                      | Right | U-Turn | Left                                                | Thru | Right |
| 7:00 AM    | 0                          | 5    | 131  | 0                          | 0      | 0    | 65                        | 40    | 0      | 13                                                  | 0    | 2     |
| 7:15 AM    | 0                          | 8    | 135  | 0                          | 0      | 0    | 69                        | 43    | 0      | 16                                                  | 0    | 3     |
| 7:30 AM    | 0                          | 11   | 139  | 0                          | 0      | 0    | 73                        | 51    | 0      | 14                                                  | 1    | 4     |
| 7:45 AM    | 0                          | 14   | 143  | 0                          | 0      | 0    | 74                        | 57    | 0      | 11                                                  | 1    | 3     |
| 8:00 AM    | 0                          | 17   | 146  | 0                          | 0      | 0    | 76                        | 63    | 0      | 9                                                   | 0    | 3     |
| 8:15 AM    | 0                          | 16   | 144  | 1                          | 0      | 0    | 78                        | 66    | 0      | 7                                                   | 1    | 2     |
| 8:30 AM    | 0                          | 14   | 142  | 0                          | 0      | 0    | 79                        | 65    | 0      | 8                                                   | 0    | 3     |
| 8:45 AM    | 0                          | 12   | 139  | 0                          | 0      | 0    | 76                        | 62    | 0      | 7                                                   | 0    | 2     |

| Start Time | Chestnut Street Northbound |      |      | Chestnut Street Southbound |        |      | Boylston Street Eastbound |       |        | Route 9 WB Service Road (Boylston Street) Westbound |      |       |
|------------|----------------------------|------|------|----------------------------|--------|------|---------------------------|-------|--------|-----------------------------------------------------|------|-------|
|            | U-Turn                     | Left | Thru | Right                      | U-Turn | Left | Thru                      | Right | U-Turn | Left                                                | Thru | Right |
| 4:00 PM    | 0                          | 9    | 105  | 0                          | 0      | 0    | 97                        | 65    | 0      | 12                                                  | 0    | 6     |
| 4:15 PM    | 0                          | 11   | 107  | 0                          | 0      | 0    | 98                        | 64    | 0      | 14                                                  | 0    | 7     |
| 4:30 PM    | 0                          | 10   | 109  | 0                          | 0      | 0    | 96                        | 61    | 0      | 20                                                  | 0    | 8     |
| 4:45 PM    | 0                          | 11   | 112  | 1                          | 0      | 0    | 101                       | 55    | 0      | 28                                                  | 0    | 8     |
| 5:00 PM    | 0                          | 12   | 114  | 0                          | 0      | 1    | 99                        | 53    | 0      | 32                                                  | 0    | 9     |
| 5:15 PM    | 0                          | 12   | 113  | 0                          | 0      | 0    | 97                        | 49    | 0      | 35                                                  | 1    | 7     |
| 5:30 PM    | 0                          | 11   | 108  | 1                          | 0      | 0    | 95                        | 48    | 0      | 34                                                  | 0    | 8     |
| 5:45 PM    | 0                          | 10   | 105  | 0                          | 0      | 0    | 93                        | 45    | 0      | 31                                                  | 1    | 6     |

| AM PEAK HOUR<br>7:45 AM to 8:45 AM<br>PHF<br>HV % | Chestnut Street Northbound |      |      | Chestnut Street Southbound |        |      | Boylston Street Eastbound |       |        | Route 9 WB Service Road (Boylston Street) Westbound |      |       |
|---------------------------------------------------|----------------------------|------|------|----------------------------|--------|------|---------------------------|-------|--------|-----------------------------------------------------|------|-------|
|                                                   | U-Turn                     | Left | Thru | Right                      | U-Turn | Left | Thru                      | Right | U-Turn | Left                                                | Thru | Right |
|                                                   | 0                          | 61   | 575  | 1                          | 0      | 0    | 307                       | 251   | 0      | 35                                                  | 2    | 11    |
|                                                   | 0.98                       |      |      | 0.97                       |        |      | 0.80                      |       |        | 0.92                                                |      |       |
|                                                   | 0.0%                       | 0.0% | 0.2% | 0.0%                       | 0.0%   | 0.0% | 0.7%                      | 0.0%  | 0.0%   | 0.0%                                                | 0.0% | 0.0%  |

| PM PEAK HOUR<br>4:45 PM to 5:45 PM<br>PHF<br>HV % | Chestnut Street Northbound |      |      | Chestnut Street Southbound |        |      | Boylston Street Eastbound |       |        | Route 9 WB Service Road (Boylston Street) Westbound |      |       |
|---------------------------------------------------|----------------------------|------|------|----------------------------|--------|------|---------------------------|-------|--------|-----------------------------------------------------|------|-------|
|                                                   | U-Turn                     | Left | Thru | Right                      | U-Turn | Left | Thru                      | Right | U-Turn | Left                                                | Thru | Right |
|                                                   | 0                          | 46   | 447  | 2                          | 0      | 1    | 392                       | 295   | 0      | 129                                                 | 1    | 32    |
|                                                   | 0.98                       |      |      | 0.96                       |        |      | 0.94                      |       |        | 0.95                                                |      |       |
|                                                   | 0.0%                       | 0.0% | 0.2% | 0.0%                       | 0.0%   | 0.0% | 0.3%                      | 0.0%  | 0.0%   | 0.0%                                                | 0.0% | 0.0%  |

11/6/2017, 8:04 AM, 12239.00\_127\_018\_TMC\_Loc 1

Client: Matt Duranleau  
Project #: 12239.00\_127\_018\_VHb  
BTD #: Location 1  
Location: Newton, MA  
Street 1: Chestnut Street / Boylston Street  
Street 2: Route 9 WB Service Road  
Count Date: 10/26/2017  
Day of Week: Thursday  
Weather: Rainy, 55°F



**TRUCKS**

| Start Time | Chestnut Street Northbound |      |      | Chestnut Street Southbound |        |      | Boylston Street Eastbound |       |        | Route 9 WB Service Road (Boylston Street) Westbound |      |       |
|------------|----------------------------|------|------|----------------------------|--------|------|---------------------------|-------|--------|-----------------------------------------------------|------|-------|
|            | U-Turn                     | Left | Thru | Right                      | U-Turn | Left | Thru                      | Right | U-Turn | Left                                                | Thru | Right |
| 7:00 AM    | 0                          | 0    | 0    | 0                          | 0      | 0    | 0                         | 0     | 1      | 0                                                   | 0    | 0     |
| 7:15 AM    | 0                          | 0    | 0    | 0                          | 0      | 0    | 0                         | 1     | 0      | 0                                                   | 0    | 0     |
| 7:30 AM    | 0                          | 0    | 0    | 0                          | 0      | 0    | 0                         | 0     | 0      | 0                                                   | 0    | 0     |
| 7:45 AM    | 0                          | 0    | 0    | 0                          | 0      | 0    | 1                         | 0     | 0      | 0                                                   | 0    | 0     |
| 8:00 AM    | 0                          | 0    | 1    | 0                          | 0      | 0    | 0                         | 0     | 0      | 0                                                   | 0    | 0     |
| 8:15 AM    | 0                          | 0    | 0    | 0                          | 0      | 0    | 1                         | 0     | 0      | 0                                                   | 0    | 0     |
| 8:30 AM    | 0                          | 0    | 0    | 0                          | 0      | 0    | 0                         | 0     | 0      | 0                                                   | 0    | 0     |
| 8:45 AM    | 0                          | 0    | 1    | 0                          | 0      | 0    | 0                         | 0     | 0      | 0                                                   | 0    | 0     |

| Start Time | Chestnut Street Northbound |      |      | Chestnut Street Southbound |        |      | Boylston Street Eastbound |       |        | Route 9 WB Service Road (Boylston Street) Westbound |      |       |
|------------|----------------------------|------|------|----------------------------|--------|------|---------------------------|-------|--------|-----------------------------------------------------|------|-------|
|            | U-Turn                     | Left | Thru | Right                      | U-Turn | Left | Thru                      | Right | U-Turn | Left                                                | Thru | Right |
| 4:00 PM    | 0                          | 0    | 1    | 0                          | 0      | 0    | 0                         | 0     | 0      | 0                                                   | 0    | 0     |
| 4:15 PM    | 0                          | 0    | 0    | 0                          | 0      | 0    | 0                         | 0     | 0      | 0                                                   | 0    | 0     |
| 4:30 PM    | 0                          | 0    | 0    | 0                          | 0      | 0    | 0                         | 0     | 0      | 0                                                   | 0    | 0     |
| 4:45 PM    | 0                          | 0    | 0    | 0                          | 0      | 0    | 1                         | 0     | 0      | 0                                                   | 0    | 0     |
| 5:00 PM    | 0                          | 0    | 0    | 0                          | 0      | 0    | 0                         | 0     | 0      | 0                                                   | 0    | 0     |
| 5:15 PM    | 0                          | 0    | 0    | 0                          | 0      | 0    | 0                         | 0     | 0      | 0                                                   | 0    | 0     |
| 5:30 PM    | 0                          | 0    | 1    | 0                          | 0      | 0    | 0                         | 0     | 0      | 0                                                   | 0    | 0     |
| 5:45 PM    | 0                          | 0    | 0    | 0                          | 0      | 0    | 0                         | 0     | 0      | 0                                                   | 0    | 0     |

| AM PEAK HOUR<br>7:00 AM to 8:00 AM<br>PHF | Chestnut Street Northbound |      |      | Chestnut Street Southbound |        |      | Boylston Street Eastbound |       |        | Route 9 WB Service Road (Boylston Street) Westbound |      |       |
|-------------------------------------------|----------------------------|------|------|----------------------------|--------|------|---------------------------|-------|--------|-----------------------------------------------------|------|-------|
|                                           | U-Turn                     | Left | Thru | Right                      | U-Turn | Left | Thru                      | Right | U-Turn | Left                                                | Thru | Right |
|                                           | 0                          | 0    | 0    | 0                          | 0      | 0    | 1                         | 1     | 0      | 1                                                   | 0    | 0     |
|                                           | 0.00                       |      |      | 0.50                       |        |      | 0.25                      |       |        | 0.00                                                |      |       |

| PM PEAK HOUR<br>4:00 PM to 5:00 PM<br>PHF | Chestnut Street Northbound |      |      | Chestnut Street Southbound |        |      | Boylston Street Eastbound |       |        | Route 9 WB Service Road (Boylston Street) Westbound |      |       |
|-------------------------------------------|----------------------------|------|------|----------------------------|--------|------|---------------------------|-------|--------|-----------------------------------------------------|------|-------|
|                                           | U-Turn                     | Left | Thru | Right                      | U-Turn | Left | Thru                      | Right | U-Turn | Left                                                | Thru | Right |
|                                           | 0                          | 0    | 1    | 0                          | 0      | 0    | 1                         | 0     | 0      | 0                                                   | 0    | 0     |
|                                           | 0.25                       |      |      | 0.25                       |        |      | 0.00                      |       |        | 0.00                                                |      |       |

11/6/2017, 8:04 AM, 12239.00\_127\_018\_TMC\_Loc 1

Client: Matt Duranleau  
Project #: 12239.00\_127\_018\_VHb  
BTD #: Location 1  
Location: Newton, MA  
Street 1: Chestnut Street / Boylston Street  
Street 2: Route 9 WB Service Road  
Count Date: 10/26/2017  
Day of Week: Thursday  
Weather: Rainy, 55°F



PEDESTRIANS & BICYCLES

| Chestnut Street Northbound |      |      |       |     | Chestnut Street Southbound |      |       |     |  | Boylston Street Eastbound |      |       |     |  | Route 9 WB Service Road (Boylston Street) Westbound |      |       |     |  |
|----------------------------|------|------|-------|-----|----------------------------|------|-------|-----|--|---------------------------|------|-------|-----|--|-----------------------------------------------------|------|-------|-----|--|
| Start Time                 | Left | Thru | Right | PED | Left                       | Thru | Right | PED |  | Left                      | Thru | Right | PED |  | Left                                                | Thru | Right | PED |  |
| 7:00 AM                    | 0    | 0    | 0     | 0   | 0                          | 0    | 0     | 0   |  | 0                         | 0    | 0     | 0   |  | 0                                                   | 0    | 0     | 0   |  |
| 7:15 AM                    | 0    | 0    | 0     | 0   | 0                          | 0    | 0     | 0   |  | 0                         | 0    | 0     | 0   |  | 0                                                   | 0    | 0     | 0   |  |
| 7:30 AM                    | 0    | 0    | 0     | 0   | 0                          | 0    | 0     | 0   |  | 0                         | 0    | 0     | 0   |  | 0                                                   | 0    | 0     | 0   |  |
| 7:45 AM                    | 0    | 0    | 0     | 0   | 0                          | 0    | 0     | 0   |  | 0                         | 0    | 0     | 0   |  | 0                                                   | 0    | 0     | 0   |  |
| 8:00 AM                    | 0    | 0    | 0     | 0   | 0                          | 0    | 0     | 0   |  | 0                         | 0    | 0     | 0   |  | 0                                                   | 0    | 0     | 1   |  |
| 8:15 AM                    | 0    | 1    | 0     | 0   | 0                          | 0    | 0     | 3   |  | 0                         | 0    | 0     | 2   |  | 0                                                   | 0    | 0     | 1   |  |
| 8:30 AM                    | 0    | 0    | 0     | 0   | 0                          | 0    | 0     | 0   |  | 0                         | 0    | 0     | 0   |  | 0                                                   | 0    | 0     | 0   |  |
| 8:45 AM                    | 0    | 0    | 0     | 0   | 0                          | 0    | 0     | 0   |  | 0                         | 0    | 0     | 0   |  | 0                                                   | 0    | 0     | 0   |  |

| Chestnut Street Northbound |      |      |       |     | Chestnut Street Southbound |      |       |     |  | Boylston Street Eastbound |      |       |     |  | Route 9 WB Service Road (Boylston Street) Westbound |      |       |     |  |
|----------------------------|------|------|-------|-----|----------------------------|------|-------|-----|--|---------------------------|------|-------|-----|--|-----------------------------------------------------|------|-------|-----|--|
| Start Time                 | Left | Thru | Right | PED | Left                       | Thru | Right | PED |  | Left                      | Thru | Right | PED |  | Left                                                | Thru | Right | PED |  |
| 4:00 PM                    | 0    | 0    | 0     | 0   | 0                          | 0    | 0     | 0   |  | 0                         | 0    | 0     | 1   |  | 0                                                   | 0    | 0     | 1   |  |
| 4:15 PM                    | 0    | 0    | 0     | 0   | 0                          | 0    | 0     | 1   |  | 0                         | 0    | 0     | 0   |  | 0                                                   | 0    | 0     | 1   |  |
| 4:30 PM                    | 0    | 0    | 0     | 0   | 0                          | 0    | 0     | 0   |  | 0                         | 0    | 0     | 0   |  | 0                                                   | 0    | 0     | 0   |  |
| 4:45 PM                    | 0    | 0    | 0     | 0   | 0                          | 0    | 0     | 0   |  | 0                         | 0    | 0     | 0   |  | 0                                                   | 0    | 0     | 0   |  |
| 5:00 PM                    | 0    | 0    | 0     | 0   | 0                          | 0    | 0     | 0   |  | 0                         | 0    | 0     | 0   |  | 0                                                   | 0    | 0     | 1   |  |
| 5:15 PM                    | 0    | 0    | 0     | 0   | 0                          | 0    | 0     | 0   |  | 0                         | 0    | 0     | 0   |  | 0                                                   | 0    | 0     | 0   |  |
| 5:30 PM                    | 0    | 0    | 0     | 0   | 0                          | 0    | 0     | 0   |  | 0                         | 0    | 0     | 0   |  | 0                                                   | 0    | 0     | 0   |  |
| 5:45 PM                    | 0    | 0    | 0     | 0   | 0                          | 0    | 0     | 0   |  | 0                         | 0    | 0     | 0   |  | 0                                                   | 0    | 0     | 0   |  |

| AM PEAK HOUR<br>7:45 AM to 8:45 AM |      |       |     |  | Chestnut Street Northbound |      |       |     |  | Chestnut Street Southbound |      |       |     |  | Boylston Street Eastbound |      |       |     |  | Route 9 WB Service Road (Boylston Street) Westbound |      |       |     |  |
|------------------------------------|------|-------|-----|--|----------------------------|------|-------|-----|--|----------------------------|------|-------|-----|--|---------------------------|------|-------|-----|--|-----------------------------------------------------|------|-------|-----|--|
| Left                               | Thru | Right | PED |  | Left                       | Thru | Right | PED |  | Left                       | Thru | Right | PED |  | Left                      | Thru | Right | PED |  | Left                                                | Thru | Right | PED |  |
| 0                                  | 1    | 0     | 0   |  | 0                          | 0    | 0     | 0   |  | 0                          | 0    | 0     | 0   |  | 0                         | 0    | 0     | 3   |  | 0                                                   | 0    | 0     | 1   |  |

| PM PEAK HOUR<br>4:45 PM to 5:45 PM |      |       |     |  | Chestnut Street Northbound |      |       |     |  | Chestnut Street Southbound |      |       |     |  | Boylston Street Eastbound |      |       |     |  | Route 9 WB Service Road (Boylston Street) Westbound |      |       |     |  |
|------------------------------------|------|-------|-----|--|----------------------------|------|-------|-----|--|----------------------------|------|-------|-----|--|---------------------------|------|-------|-----|--|-----------------------------------------------------|------|-------|-----|--|
| Left                               | Thru | Right | PED |  | Left                       | Thru | Right | PED |  | Left                       | Thru | Right | PED |  | Left                      | Thru | Right | PED |  | Left                                                | Thru | Right | PED |  |
| 0                                  | 0    | 0     | 0   |  | 0                          | 0    | 0     | 0   |  | 0                          | 0    | 0     | 0   |  | 0                         | 0    | 0     | 0   |  | 0                                                   | 0    | 0     | 1   |  |

\* Peak hours corresponds to vehicular peak hours.

11/6/2017, 8:04 AM, 12239.00\_127\_018\_TMC\_Loc 1

Client: Matt Duranleau  
Project #: 12239.00\_127\_018\_VHb  
BTD #: Location 2  
Location: Newton, MA  
Street 1: Chestnut Street / Boylston Street  
Street 2: Route 9 EB Service Road  
Count Date: 10/26/2017  
Day of Week: Thursday  
Weather: Rainy, 55°F



TOTAL (CARS & TRUCKS)

| Chestnut Street Northbound |        |      |      |       | Chestnut Street Southbound |      |      |       |  | Route 9 EB Service Road (Boylston Street) Eastbound |      |      |       |  | Boylston Street Westbound |      |      |       |  |
|----------------------------|--------|------|------|-------|----------------------------|------|------|-------|--|-----------------------------------------------------|------|------|-------|--|---------------------------|------|------|-------|--|
| Start Time                 | U-Turn | Left | Thru | Right | U-Turn                     | Left | Thru | Right |  | U-Turn                                              | Left | Thru | Right |  | U-Turn                    | Left | Thru | Right |  |
| 7:00 AM                    | 0      | 1    | 61   | 4     | 0                          | 12   | 71   | 0     |  | 0                                                   | 69   | 19   | 2     |  | 0                         | 0    | 1    | 6     |  |
| 7:15 AM                    | 0      | 0    | 63   | 7     | 0                          | 14   | 73   | 0     |  | 0                                                   | 73   | 18   | 3     |  | 0                         | 1    | 2    | 7     |  |
| 7:30 AM                    | 0      | 1    | 67   | 9     | 0                          | 15   | 75   | 1     |  | 0                                                   | 75   | 17   | 3     |  | 0                         | 1    | 1    | 8     |  |
| 7:45 AM                    | 0      | 1    | 78   | 12    | 0                          | 16   | 74   | 0     |  | 0                                                   | 70   | 16   | 2     |  | 0                         | 0    | 2    | 9     |  |
| 8:00 AM                    | 0      | 0    | 89   | 14    | 0                          | 17   | 73   | 1     |  | 0                                                   | 63   | 14   | 2     |  | 0                         | 0    | 2    | 11    |  |
| 8:15 AM                    | 0      | 1    | 88   | 13    | 0                          | 18   | 72   | 1     |  | 0                                                   | 62   | 13   | 3     |  | 0                         | 0    | 1    | 10    |  |
| 8:30 AM                    | 0      | 1    | 86   | 11    | 0                          | 18   | 74   | 0     |  | 0                                                   | 61   | 11   | 2     |  | 0                         | 0    | 0    | 9     |  |
| 8:45 AM                    | 0      | 0    | 85   | 10    | 0                          | 17   | 72   | 0     |  | 0                                                   | 58   | 10   | 1     |  | 0                         | 0    | 1    | 8     |  |

| Chestnut Street Northbound |        |      |      |       | Chestnut Street Southbound |      |      |       |  | Route 9 EB Service Road (Boylston Street) Eastbound |      |      |       |  | Boylston Street Westbound |      |      |       |  |
|----------------------------|--------|------|------|-------|----------------------------|------|------|-------|--|-----------------------------------------------------|------|------|-------|--|---------------------------|------|------|-------|--|
| Start Time                 | U-Turn | Left | Thru | Right | U-Turn                     | Left | Thru | Right |  | U-Turn                                              | Left | Thru | Right |  | U-Turn                    | Left | Thru | Right |  |
| 4:00 PM                    | 0      | 0    | 73   | 4     | 0                          | 19   | 102  | 0     |  | 0                                                   | 37   | 33   | 2     |  | 0                         | 0    | 1    | 4     |  |
| 4:15 PM                    | 0      | 1    | 72   | 5     | 0                          | 21   | 106  | 0     |  | 0                                                   | 40   | 35   | 2     |  | 0                         | 0    | 0    | 5     |  |
| 4:30 PM                    | 0      | 1    | 74   | 6     | 0                          | 24   | 104  | 1     |  | 0                                                   | 41   | 36   | 1     |  | 0                         | 0    | 0    | 4     |  |
| 4:45 PM                    | 0      | 0    | 75   | 5     | 0                          | 22   | 113  | 0     |  | 0                                                   | 44   | 38   | 2     |  | 0                         | 0    | 0    | 5     |  |
| 5:00 PM                    | 0      | 0    | 74   | 5     | 0                          | 23   | 115  | 0     |  | 0                                                   | 45   | 39   | 1     |  | 0                         | 0    | 1    | 7     |  |
| 5:15 PM                    | 0      | 1    | 75   | 6     | 0                          | 25   | 109  | 1     |  | 0                                                   | 44   | 38   | 2     |  | 0                         | 1    | 1    | 6     |  |
| 5:30 PM                    | 0      | 1    | 72   | 4     | 0                          | 22   | 108  | 1     |  | 0                                                   | 42   | 37   | 1     |  | 0                         | 1    | 0    | 6     |  |
| 5:45 PM                    | 0      | 0    | 71   | 3     | 0                          | 19   | 106  | 0     |  | 0                                                   | 39   | 34   | 1     |  | 0                         | 0    | 1    | 5     |  |

| AM PEAK HOUR<br>7:30 AM<br>to<br>8:30 AM |  |  |  |  | Chestnut Street<br>Northbound |      |      |       |  | Chestnut Street<br>Southbound |      |      |       |  | Route 9 EB Service Road (Boylston Street)<br>Eastbound |      |      |       |  | Boylston Street<br>Westbound |      |      |       |  |
|------------------------------------------|--|--|--|--|-------------------------------|------|------|-------|--|-------------------------------|------|------|-------|--|--------------------------------------------------------|------|------|-------|--|------------------------------|------|------|-------|--|
|                                          |  |  |  |  | U-Turn                        | Left | Thru | Right |  | U-Turn                        | Left | Thru | Right |  | U-Turn                                                 | Left | Thru | Right |  | U-Turn                       | Left | Thru | Right |  |
|                                          |  |  |  |  | 0                             | 3    | 322  | 48    |  | 0                             | 66   | 294  | 3     |  | 0                                                      | 270  | 60   | 10    |  | 0                            | 1    | 6    | 38    |  |
| PHF                                      |  |  |  |  | 0.91                          |      |      |       |  | 1.00                          |      |      |       |  | 0.89                                                   |      |      |       |  | 0.87                         |      |      |       |  |
| HV %                                     |  |  |  |  | 0.0%                          | 0.0% | 0.3% | 0.0%  |  | 0.0%                          | 0.0% | 0.7% | 0.0%  |  | 0.0%                                                   | 0.0% | 0.0% | 0.0%  |  | 0.0%                         | 0.0% | 0.0% | 0.0%  |  |

| PM PEAK HOUR<br>4:45 PM<br>to<br>5:45 PM<br><br>PHF<br>HV % |  | Chestnut Street<br>Northbound |      |      |       | Chestnut Street<br>Southbound |      |      |       | Route 9 EB Service Road (Boylston Street)<br>Eastbound |      |      |       | Boylston Street<br>Westbound |      |      |       |
|-------------------------------------------------------------|--|-------------------------------|------|------|-------|-------------------------------|------|------|-------|--------------------------------------------------------|------|------|-------|------------------------------|------|------|-------|
|                                                             |  | U-Turn                        | Left | Thru | Right | U-Turn                        | Left | Thru | Right | U-Turn                                                 | Left | Thru | Right | U-Turn                       | Left | Thru | Right |
|                                                             |  | 0                             | 2    | 296  | 20    | 0                             | 92   | 445  | 2     | 0                                                      | 175  | 152  | 6     | 0                            | 2    | 2    | 24    |
|                                                             |  | 0.97                          |      |      |       | 0.98                          |      |      |       | 0.98                                                   |      |      |       | 0.88                         |      |      |       |
|                                                             |  | 0.0%                          | 0.0% | 0.3% | 0.0%  | 0.0%                          | 0.0% | 0.2% | 0.0%  | 0.0%                                                   | 0.0% | 0.0% | 0.0%  | 0.0%                         | 0.0% | 0.0% | 0.0%  |

11/6/2017, 8:06 AM, 12239.00\_127\_018\_TMC\_Loc 2

Client: Matt Duranleau  
Project #: 12239.00\_127\_018\_VHb  
BTD #: Location 2  
Location: Newton, MA  
Street 1: Chestnut Street / Boylston Street  
Street 2: Route 9 EB Service Road  
Count Date: 10/26/2017  
Day of Week: Thursday  
Weather: Rainy, 55°F



#### TRUCKS

| Start Time | Chestnut Street Northbound |      |      |       | Chestnut Street Southbound |      |      |       | Route 9 EB Service Road (Boylston Street) Eastbound |      |      |       | Boylston Street Westbound |      |      |       |
|------------|----------------------------|------|------|-------|----------------------------|------|------|-------|-----------------------------------------------------|------|------|-------|---------------------------|------|------|-------|
|            | U-Turn                     | Left | Thru | Right | U-Turn                     | Left | Thru | Right | U-Turn                                              | Left | Thru | Right | U-Turn                    | Left | Thru | Right |
| 7:00 AM    | 0                          | 0    | 0    | 0     | 0                          | 0    | 0    | 0     | 0                                                   | 0    | 0    | 0     | 0                         | 0    | 0    | 0     |
| 7:15 AM    | 0                          | 0    | 0    | 0     | 0                          | 0    | 0    | 0     | 0                                                   | 0    | 0    | 0     | 0                         | 0    | 0    | 0     |
| 7:30 AM    | 0                          | 0    | 0    | 0     | 0                          | 0    | 0    | 0     | 0                                                   | 0    | 0    | 0     | 0                         | 0    | 0    | 0     |
| 7:45 AM    | 0                          | 0    | 0    | 0     | 0                          | 0    | 1    | 0     | 0                                                   | 0    | 0    | 0     | 0                         | 0    | 0    | 0     |
| 8:00 AM    | 0                          | 0    | 1    | 0     | 0                          | 0    | 0    | 0     | 0                                                   | 0    | 0    | 0     | 0                         | 0    | 0    | 0     |
| 8:15 AM    | 0                          | 0    | 0    | 0     | 0                          | 0    | 1    | 0     | 0                                                   | 0    | 0    | 0     | 0                         | 0    | 0    | 0     |
| 8:30 AM    | 0                          | 0    | 0    | 0     | 0                          | 0    | 0    | 0     | 0                                                   | 0    | 0    | 0     | 0                         | 0    | 0    | 0     |
| 8:45 AM    | 0                          | 0    | 1    | 0     | 0                          | 0    | 0    | 0     | 0                                                   | 0    | 0    | 0     | 0                         | 0    | 0    | 0     |

| Start Time | Chestnut Street Northbound |      |      |       | Chestnut Street Southbound |      |      |       | Route 9 EB Service Road (Boylston Street) Eastbound |      |      |       | Boylston Street Westbound |      |      |       |
|------------|----------------------------|------|------|-------|----------------------------|------|------|-------|-----------------------------------------------------|------|------|-------|---------------------------|------|------|-------|
|            | U-Turn                     | Left | Thru | Right | U-Turn                     | Left | Thru | Right | U-Turn                                              | Left | Thru | Right | U-Turn                    | Left | Thru | Right |
| 4:00 PM    | 0                          | 0    | 1    | 0     | 0                          | 0    | 0    | 0     | 0                                                   | 0    | 0    | 0     | 0                         | 0    | 0    | 0     |
| 4:15 PM    | 0                          | 0    | 0    | 0     | 0                          | 0    | 0    | 0     | 0                                                   | 0    | 0    | 0     | 0                         | 0    | 0    | 0     |
| 4:30 PM    | 0                          | 0    | 0    | 0     | 0                          | 0    | 0    | 0     | 0                                                   | 0    | 0    | 0     | 0                         | 0    | 0    | 0     |
| 4:45 PM    | 0                          | 0    | 0    | 0     | 0                          | 0    | 1    | 0     | 0                                                   | 0    | 0    | 0     | 0                         | 0    | 0    | 0     |
| 5:00 PM    | 0                          | 0    | 0    | 0     | 0                          | 0    | 0    | 0     | 0                                                   | 0    | 0    | 0     | 0                         | 0    | 0    | 0     |
| 5:15 PM    | 0                          | 0    | 0    | 0     | 0                          | 0    | 0    | 0     | 0                                                   | 0    | 0    | 0     | 0                         | 0    | 0    | 0     |
| 5:30 PM    | 0                          | 0    | 1    | 0     | 0                          | 0    | 0    | 0     | 0                                                   | 0    | 0    | 0     | 0                         | 0    | 0    | 0     |
| 5:45 PM    | 0                          | 0    | 0    | 0     | 0                          | 0    | 0    | 0     | 0                                                   | 0    | 0    | 0     | 0                         | 0    | 0    | 0     |

| AM PEAK HOUR<br>7:30 AM<br>to<br>8:30 AM<br>PHF | Chestnut Street Northbound |      |      |       | Chestnut Street Southbound |      |      |       | Route 9 EB Service Road (Boylston Street) Eastbound |      |      |       | Boylston Street Westbound |      |      |       |
|-------------------------------------------------|----------------------------|------|------|-------|----------------------------|------|------|-------|-----------------------------------------------------|------|------|-------|---------------------------|------|------|-------|
|                                                 | U-Turn                     | Left | Thru | Right | U-Turn                     | Left | Thru | Right | U-Turn                                              | Left | Thru | Right | U-Turn                    | Left | Thru | Right |
|                                                 | 0                          | 0    | 1    | 0     | 0                          | 0    | 2    | 0     | 0                                                   | 0    | 0    | 0     | 0                         | 0    | 0    | 0     |
| 0.25                                            |                            |      |      | 0.50  |                            |      |      | 0.00  |                                                     |      |      | 0.00  |                           |      |      |       |

| PM PEAK HOUR<br>4:00 PM<br>to<br>5:00 PM<br>PHF | Chestnut Street Northbound |      |      |       | Chestnut Street Southbound |      |      |       | Route 9 EB Service Road (Boylston Street) Eastbound |      |      |       | Boylston Street Westbound |      |      |       |
|-------------------------------------------------|----------------------------|------|------|-------|----------------------------|------|------|-------|-----------------------------------------------------|------|------|-------|---------------------------|------|------|-------|
|                                                 | U-Turn                     | Left | Thru | Right | U-Turn                     | Left | Thru | Right | U-Turn                                              | Left | Thru | Right | U-Turn                    | Left | Thru | Right |
|                                                 | 0                          | 0    | 1    | 0     | 0                          | 0    | 1    | 0     | 0                                                   | 0    | 0    | 0     | 0                         | 0    | 0    | 0     |
| 0.25                                            |                            |      |      | 0.25  |                            |      |      | 0.00  |                                                     |      |      | 0.00  |                           |      |      |       |

Client: Matt Duranleau  
Project #: 12239.00\_127\_018\_VHb  
BTD #: Location 2  
Location: Newton, MA  
Street 1: Chestnut Street / Boylston Street  
Street 2: Route 9 EB Service Road  
Count Date: 10/26/2017  
Day of Week: Thursday  
Weather: Rainy, 55°F



#### PEDESTRIANS & BICYCLES

| Start Time | Chestnut Street Northbound |      |       |     | Chestnut Street Southbound |      |       |     | Route 9 EB Service Road (Boylston Street) Eastbound |      |       |     | Boylston Street Westbound |      |       |     |
|------------|----------------------------|------|-------|-----|----------------------------|------|-------|-----|-----------------------------------------------------|------|-------|-----|---------------------------|------|-------|-----|
|            | Left                       | Thru | Right | PED | Left                       | Thru | Right | PED | Left                                                | Thru | Right | PED | Left                      | Thru | Right | PED |
| 7:00 AM    | 0                          | 0    | 0     | 0   | 0                          | 0    | 0     | 0   | 0                                                   | 0    | 0     | 0   | 0                         | 0    | 0     | 0   |
| 7:15 AM    | 0                          | 0    | 0     | 1   | 0                          | 0    | 0     | 0   | 0                                                   | 0    | 0     | 0   | 0                         | 0    | 0     | 1   |
| 7:30 AM    | 0                          | 0    | 0     | 0   | 0                          | 0    | 0     | 0   | 0                                                   | 0    | 0     | 0   | 0                         | 0    | 0     | 0   |
| 7:45 AM    | 0                          | 0    | 0     | 0   | 0                          | 0    | 0     | 0   | 0                                                   | 0    | 1     | 0   | 0                         | 0    | 0     | 0   |
| 8:00 AM    | 0                          | 0    | 0     | 0   | 0                          | 0    | 0     | 0   | 0                                                   | 0    | 0     | 0   | 0                         | 0    | 0     | 0   |
| 8:15 AM    | 0                          | 1    | 0     | 1   | 0                          | 0    | 0     | 0   | 0                                                   | 0    | 2     | 0   | 0                         | 0    | 2     | 0   |
| 8:30 AM    | 0                          | 0    | 0     | 0   | 0                          | 0    | 0     | 0   | 0                                                   | 0    | 0     | 0   | 0                         | 0    | 0     | 0   |
| 8:45 AM    | 0                          | 0    | 0     | 0   | 0                          | 0    | 0     | 0   | 0                                                   | 0    | 0     | 0   | 0                         | 0    | 0     | 0   |

| Start Time | Chestnut Street Northbound |      |       |     | Chestnut Street Southbound |      |       |     | Route 9 EB Service Road (Boylston Street) Eastbound |      |       |     | Boylston Street Westbound |      |       |     |
|------------|----------------------------|------|-------|-----|----------------------------|------|-------|-----|-----------------------------------------------------|------|-------|-----|---------------------------|------|-------|-----|
|            | Left                       | Thru | Right | PED | Left                       | Thru | Right | PED | Left                                                | Thru | Right | PED | Left                      | Thru | Right | PED |
| 4:00 PM    | 0                          | 0    | 0     | 0   | 0                          | 0    | 0     | 0   | 0                                                   | 0    | 1     | 0   | 0                         | 0    | 0     | 1   |
| 4:15 PM    | 0                          | 0    | 0     | 1   | 0                          | 0    | 0     | 0   | 0                                                   | 0    | 0     | 0   | 0                         | 0    | 0     | 2   |
| 4:30 PM    | 0                          | 0    | 0     | 0   | 0                          | 0    | 0     | 0   | 0                                                   | 0    | 0     | 0   | 0                         | 0    | 0     | 0   |
| 4:45 PM    | 0                          | 0    | 0     | 0   | 0                          | 0    | 0     | 0   | 0                                                   | 0    | 0     | 0   | 0                         | 0    | 0     | 0   |
| 5:00 PM    | 0                          | 0    | 0     | 0   | 0                          | 0    | 0     | 0   | 0                                                   | 0    | 0     | 0   | 0                         | 0    | 0     | 1   |
| 5:15 PM    | 0                          | 0    | 0     | 0   | 0                          | 0    | 0     | 0   | 0                                                   | 0    | 0     | 0   | 0                         | 0    | 0     | 0   |
| 5:30 PM    | 0                          | 0    | 0     | 0   | 0                          | 0    | 0     | 0   | 0                                                   | 0    | 0     | 0   | 0                         | 0    | 0     | 0   |
| 5:45 PM    | 0                          | 0    | 0     | 0   | 0                          | 0    | 0     | 0   | 0                                                   | 0    | 0     | 0   | 0                         | 0    | 0     | 0   |

| AM PEAK HOUR<br>7:30 AM<br>to<br>8:30 AM | Chestnut Street Northbound |      |       |     | Chestnut Street Southbound |      |       |     | Route 9 EB Service Road (Boylston Street) Eastbound |      |       |     | Boylston Street Westbound |      |       |     |
|------------------------------------------|----------------------------|------|-------|-----|----------------------------|------|-------|-----|-----------------------------------------------------|------|-------|-----|---------------------------|------|-------|-----|
|                                          | Left                       | Thru | Right | PED | Left                       | Thru | Right | PED | Left                                                | Thru | Right | PED | Left                      | Thru | Right | PED |
|                                          | 0                          | 1    | 0     | 1   | 0                          | 0    | 0     | 0   | 0                                                   | 0    | 3     | 0   | 0                         | 0    | 0     | 2   |

| PM PEAK HOUR<br>4:45 PM<br>to<br>5:45 PM | Chestnut Street Northbound |      |       |     | Chestnut Street Southbound |      |       |     | Route 9 EB Service Road (Boylston Street) Eastbound |      |       |     | Boylston Street Westbound |      |       |     |
|------------------------------------------|----------------------------|------|-------|-----|----------------------------|------|-------|-----|-----------------------------------------------------|------|-------|-----|---------------------------|------|-------|-----|
|                                          | Left                       | Thru | Right | PED | Left                       | Thru | Right | PED | Left                                                | Thru | Right | PED | Left                      | Thru | Right | PED |
|                                          | 0                          | 0    | 0     | 0   | 0                          | 0    | 0     | 0   | 0                                                   | 0    | 0     | 0   | 0                         | 0    | 0     | 1   |

\*Peak hour corresponds to vehicular peak hours.

Client: Matt Duranleau  
Project #: 12239.00\_127\_018\_VHb  
BTD #: Location 3  
Location: Newton, MA  
Street 1: Chestnut Street  
Street 2: Elliot Street  
Count Date: 10/26/2017  
Day of Week: Thursday  
Weather: Rainy, 55°F



#### TOTAL (CARS & TRUCKS)

| Chestnut Street Northbound |        |      |      |       | Chestnut Street Southbound |      |      |       |        | Elliot Street Eastbound |      |       |        |      | Elliot Street Westbound |       |  |  |  |
|----------------------------|--------|------|------|-------|----------------------------|------|------|-------|--------|-------------------------|------|-------|--------|------|-------------------------|-------|--|--|--|
| Start Time                 | U-Turn | Left | Thru | Right | U-Turn                     | Left | Thru | Right | U-Turn | Left                    | Thru | Right | U-Turn | Left | Thru                    | Right |  |  |  |
| 7:00 AM                    | 0      | 3    | 22   | 2     | 0                          | 12   | 36   | 26    | 0      | 74                      | 76   | 11    | 0      | 1    | 9                       | 10    |  |  |  |
| 7:15 AM                    | 0      | 6    | 29   | 1     | 0                          | 14   | 41   | 29    | 0      | 77                      | 80   | 13    | 0      | 2    | 12                      | 11    |  |  |  |
| 7:30 AM                    | 0      | 8    | 35   | 2     | 0                          | 13   | 45   | 33    | 0      | 81                      | 78   | 12    | 0      | 2    | 14                      | 10    |  |  |  |
| 7:45 AM                    | 0      | 10   | 40   | 3     | 0                          | 12   | 48   | 36    | 0      | 82                      | 72   | 11    | 0      | 3    | 15                      | 9     |  |  |  |
| 8:00 AM                    | 0      | 12   | 43   | 1     | 0                          | 10   | 54   | 40    | 0      | 88                      | 69   | 12    | 0      | 1    | 16                      | 11    |  |  |  |
| 8:15 AM                    | 0      | 11   | 42   | 2     | 0                          | 7    | 57   | 43    | 0      | 90                      | 63   | 10    | 0      | 2    | 15                      | 10    |  |  |  |
| 8:30 AM                    | 0      | 10   | 39   | 1     | 0                          | 8    | 56   | 42    | 0      | 89                      | 64   | 11    | 0      | 1    | 13                      | 8     |  |  |  |
| 8:45 AM                    | 0      | 9    | 34   | 1     | 0                          | 6    | 52   | 39    | 0      | 84                      | 61   | 9     | 0      | 1    | 12                      | 7     |  |  |  |

| Chestnut Street Northbound |        |      |      |       | Chestnut Street Southbound |      |      |       |        | Elliot Street Eastbound |      |       |        |      | Elliot Street Westbound |       |  |  |  |
|----------------------------|--------|------|------|-------|----------------------------|------|------|-------|--------|-------------------------|------|-------|--------|------|-------------------------|-------|--|--|--|
| Start Time                 | U-Turn | Left | Thru | Right | U-Turn                     | Left | Thru | Right | U-Turn | Left                    | Thru | Right | U-Turn | Left | Thru                    | Right |  |  |  |
| 4:00 PM                    | 0      | 18   | 46   | 2     | 0                          | 6    | 54   | 76    | 0      | 27                      | 34   | 13    | 0      | 2    | 47                      | 9     |  |  |  |
| 4:15 PM                    | 0      | 19   | 48   | 3     | 0                          | 7    | 58   | 79    | 0      | 30                      | 36   | 16    | 0      | 1    | 47                      | 10    |  |  |  |
| 4:30 PM                    | 0      | 20   | 47   | 2     | 0                          | 11   | 63   | 78    | 0      | 34                      | 46   | 15    | 0      | 2    | 46                      | 11    |  |  |  |
| 4:45 PM                    | 0      | 21   | 49   | 1     | 0                          | 14   | 65   | 76    | 0      | 37                      | 54   | 14    | 0      | 3    | 48                      | 12    |  |  |  |
| 5:00 PM                    | 0      | 22   | 50   | 1     | 0                          | 17   | 71   | 75    | 0      | 42                      | 64   | 13    | 0      | 2    | 48                      | 12    |  |  |  |
| 5:15 PM                    | 0      | 21   | 51   | 2     | 0                          | 20   | 74   | 72    | 0      | 45                      | 71   | 11    | 0      | 3    | 47                      | 11    |  |  |  |
| 5:30 PM                    | 0      | 20   | 48   | 1     | 0                          | 19   | 73   | 71    | 0      | 44                      | 68   | 10    | 0      | 2    | 45                      | 10    |  |  |  |
| 5:45 PM                    | 0      | 18   | 45   | 2     | 0                          | 17   | 71   | 67    | 0      | 41                      | 63   | 9     | 0      | 1    | 43                      | 9     |  |  |  |

| AM PEAK HOUR<br>7:45 AM<br>to<br>8:45 AM<br>PHF<br>HV % | Chestnut Street Northbound |      |      |       | Chestnut Street Southbound |      |      |       | Elliot Street Eastbound |      |      |       | Elliot Street Westbound |      |      |       |
|---------------------------------------------------------|----------------------------|------|------|-------|----------------------------|------|------|-------|-------------------------|------|------|-------|-------------------------|------|------|-------|
|                                                         | U-Turn                     | Left | Thru | Right | U-Turn                     | Left | Thru | Right | U-Turn                  | Left | Thru | Right | U-Turn                  | Left | Thru | Right |
|                                                         | 0                          | 43   | 164  | 7     | 0                          | 37   | 215  | 161   | 0                       | 349  | 268  | 44    | 0                       | 7    | 59   | 38    |
|                                                         | 0.96                       |      |      |       | 0.96                       |      |      |       | 0.98                    |      |      |       | 0.93                    |      |      |       |
|                                                         | 0.0%                       | 0.0% | 1.2% | 0.0%  | 0.0%                       | 0.0% | 0.5% | 0.0%  | 0.0%                    | 0.0% | 0.0% | 0.0%  | 0.0%                    | 0.0% | 0.0% | 0.0%  |

| PM PEAK HOUR<br>4:45 PM<br>to<br>5:45 PM<br>PHF<br>HV % | Chestnut Street Northbound |      |      |       | Chestnut Street Southbound |      |      |       | Elliot Street Eastbound |      |      |       | Elliot Street Westbound |      |      |       |
|---------------------------------------------------------|----------------------------|------|------|-------|----------------------------|------|------|-------|-------------------------|------|------|-------|-------------------------|------|------|-------|
|                                                         | U-Turn                     | Left | Thru | Right | U-Turn                     | Left | Thru | Right | U-Turn                  | Left | Thru | Right | U-Turn                  | Left | Thru | Right |
|                                                         | 0                          | 84   | 198  | 5     | 0                          | 79   | 253  | 284   | 0                       | 168  | 257  | 46    | 0                       | 10   | 188  | 45    |
|                                                         | 0.97                       |      |      |       | 0.97                       |      |      |       | 0.93                    |      |      |       | 0.96                    |      |      |       |
|                                                         | 0.0%                       | 0.0% | 0.5% | 0.0%  | 0.0%                       | 0.0% | 0.0% | 0.0%  | 0.0%                    | 0.0% | 0.4% | 0.0%  | 0.0%                    | 0.0% | 0.0% | 0.0%  |

11/6/2017, 8:09 AM, 12239.00\_127\_018\_TMC\_Loc 3

Client: Matt Duranleau  
Project #: 12239.00\_127\_018\_VHb  
BTD #: Location 3  
Location: Newton, MA  
Street 1: Chestnut Street  
Street 2: Elliot Street  
Count Date: 10/26/2017  
Day of Week: Thursday  
Weather: Rainy, 55°F



#### TRUCKS

| Chestnut Street Northbound |        |      |      |       | Chestnut Street Southbound |      |      |       |        | Elliot Street Eastbound |      |       |        |      | Elliot Street Westbound |       |  |  |  |
|----------------------------|--------|------|------|-------|----------------------------|------|------|-------|--------|-------------------------|------|-------|--------|------|-------------------------|-------|--|--|--|
| Start Time                 | U-Turn | Left | Thru | Right | U-Turn                     | Left | Thru | Right | U-Turn | Left                    | Thru | Right | U-Turn | Left | Thru                    | Right |  |  |  |
| 7:00 AM                    | 0      | 0    | 0    | 0     | 0                          | 0    | 0    | 0     | 0      | 0                       | 0    | 0     | 0      | 0    | 0                       | 0     |  |  |  |
| 7:15 AM                    | 0      | 0    | 0    | 0     | 0                          | 0    | 0    | 0     | 0      | 0                       | 1    | 0     | 0      | 0    | 0                       | 0     |  |  |  |
| 7:30 AM                    | 0      | 0    | 0    | 0     | 0                          | 0    | 1    | 0     | 0      | 0                       | 0    | 0     | 0      | 0    | 0                       | 0     |  |  |  |
| 7:45 AM                    | 0      | 0    | 1    | 0     | 0                          | 0    | 0    | 0     | 0      | 0                       | 0    | 0     | 0      | 0    | 0                       | 0     |  |  |  |
| 8:00 AM                    | 0      | 0    | 0    | 0     | 0                          | 0    | 0    | 0     | 0      | 0                       | 0    | 0     | 0      | 0    | 0                       | 0     |  |  |  |
| 8:15 AM                    | 0      | 0    | 0    | 0     | 0                          | 0    | 1    | 0     | 0      | 0                       | 0    | 0     | 0      | 0    | 0                       | 0     |  |  |  |
| 8:30 AM                    | 0      | 0    | 1    | 0     | 0                          | 0    | 0    | 0     | 0      | 0                       | 0    | 0     | 0      | 0    | 0                       | 0     |  |  |  |
| 8:45 AM                    | 0      | 0    | 0    | 0     | 0                          | 0    | 0    | 1     | 0      | 0                       | 0    | 0     | 0      | 0    | 0                       | 0     |  |  |  |

| Chestnut Street Northbound |        |      |      |       | Chestnut Street Southbound |      |      |       |        | Elliot Street Eastbound |      |       |        |      | Elliot Street Westbound |       |  |  |  |
|----------------------------|--------|------|------|-------|----------------------------|------|------|-------|--------|-------------------------|------|-------|--------|------|-------------------------|-------|--|--|--|
| Start Time                 | U-Turn | Left | Thru | Right | U-Turn                     | Left | Thru | Right | U-Turn | Left                    | Thru | Right | U-Turn | Left | Thru                    | Right |  |  |  |
| 4:00 PM                    | 0      | 0    | 1    | 0     | 0                          | 0    | 0    | 0     | 0      | 0                       | 0    | 0     | 0      | 0    | 0                       | 0     |  |  |  |
| 4:15 PM                    | 0      | 0    | 0    | 0     | 0                          | 0    | 0    | 1     | 0      | 0                       | 0    | 0     | 0      | 0    | 0                       | 0     |  |  |  |
| 4:30 PM                    | 0      | 0    | 0    | 0     | 0                          | 0    | 1    | 0     | 0      | 0                       | 0    | 0     | 0      | 0    | 0                       | 0     |  |  |  |
| 4:45 PM                    | 0      | 0    | 0    | 0     | 0                          | 0    | 0    | 0     | 0      | 0                       | 0    | 0     | 0      | 0    | 0                       | 0     |  |  |  |
| 5:00 PM                    | 0      | 0    | 0    | 0     | 0                          | 0    | 0    | 0     | 0      | 0                       | 1    | 0     | 0      | 0    | 0                       | 0     |  |  |  |
| 5:15 PM                    | 0      | 0    | 1    | 0     | 0                          | 0    | 0    | 0     | 0      | 0                       | 0    | 0     | 0      | 0    | 0                       | 0     |  |  |  |
| 5:30 PM                    | 0      | 0    | 0    | 0     | 0                          | 0    | 0    | 0     | 0      | 0                       | 0    | 0     | 0      | 0    | 0                       | 0     |  |  |  |
| 5:45 PM                    | 0      | 0    | 0    | 0     | 0                          | 0    | 0    | 0     | 0      | 0                       | 0    | 0     | 0      | 0    | 0                       | 0     |  |  |  |

| AM PEAK HOUR<br>7:00 AM<br>to<br>8:00 AM<br>PHF | Chestnut Street Northbound |      |      |       | Chestnut Street Southbound |      |      |       | Elliot Street Eastbound |      |      |       | Elliot Street Westbound |      |      |       |
|-------------------------------------------------|----------------------------|------|------|-------|----------------------------|------|------|-------|-------------------------|------|------|-------|-------------------------|------|------|-------|
|                                                 | U-Turn                     | Left | Thru | Right | U-Turn                     | Left | Thru | Right | U-Turn                  | Left | Thru | Right | U-Turn                  | Left | Thru | Right |
|                                                 | 0                          | 0    | 1    | 0     | 0                          | 0    | 1    | 0     | 0                       | 0    | 1    | 0     | 0                       | 0    | 0    | 0     |
|                                                 | 0.25                       |      |      |       | 0.25                       |      |      |       | 0.25                    |      |      |       | 0.00                    |      |      |       |

| PM PEAK HOUR<br>4:00 PM<br>to<br>5:00 PM<br>PHF | Chestnut Street Northbound |      |      |       | Chestnut Street Southbound |      |      |       | Elliot Street Eastbound |      |      |       | Elliot Street Westbound |      |      |       |
|-------------------------------------------------|----------------------------|------|------|-------|----------------------------|------|------|-------|-------------------------|------|------|-------|-------------------------|------|------|-------|
|                                                 | U-Turn                     | Left | Thru | Right | U-Turn                     | Left | Thru | Right | U-Turn                  | Left | Thru | Right | U-Turn                  | Left | Thru | Right |
|                                                 | 0                          | 0    | 1    | 0     | 0                          | 0    | 1    | 1     | 0                       | 0    | 0    | 0     | 0                       | 0    | 0    | 0     |
|                                                 | 0.25                       |      |      |       | 0.50                       |      |      |       | 0.00                    |      |      |       | 0.00                    |      |      |       |

11/6/2017, 8:09 AM, 12239.00\_127\_018\_TMC\_Loc 3



Client: Matt Duranleau  
Project #: 12239.00\_127\_018\_VHb  
BTD #: Location 3  
Location: Newton, MA  
Street 1: Chestnut Street  
Street 2: Elliot Street  
Count Date: 10/26/2017  
Day of Week: Thursday  
Weather: Rainy, 55°F



PEDESTRIANS & BICYCLES

| Chestnut Street Northbound |      |      |       |     | Chestnut Street Southbound |      |       |     |  | Elliot Street Eastbound |      |       |     |  | Elliot Street Westbound |      |       |     |   |
|----------------------------|------|------|-------|-----|----------------------------|------|-------|-----|--|-------------------------|------|-------|-----|--|-------------------------|------|-------|-----|---|
| Start Time                 | Left | Thru | Right | PED | Left                       | Thru | Right | PED |  | Left                    | Thru | Right | PED |  | Left                    | Thru | Right | PED |   |
| 7:00 AM                    | 0    | 0    | 0     | 1   | 0                          | 0    | 0     | 1   |  | 0                       | 0    | 0     | 0   |  | 0                       | 0    | 0     | 0   |   |
| 7:15 AM                    | 0    | 0    | 0     | 0   | 0                          | 0    | 0     | 0   |  | 0                       | 0    | 0     | 0   |  | 0                       | 0    | 0     | 0   |   |
| 7:30 AM                    | 0    | 0    | 0     | 0   | 0                          | 0    | 0     | 0   |  | 0                       | 0    | 0     | 0   |  | 0                       | 0    | 0     | 0   |   |
| 7:45 AM                    | 0    | 0    | 0     | 0   | 0                          | 0    | 0     | 1   |  | 0                       | 0    | 0     | 0   |  | 0                       | 0    | 0     | 0   | 1 |
| 8:00 AM                    | 0    | 0    | 0     | 0   | 0                          | 0    | 0     | 0   |  | 0                       | 0    | 0     | 1   |  | 0                       | 0    | 0     | 0   |   |
| 8:15 AM                    | 0    | 0    | 0     | 1   | 0                          | 0    | 0     | 0   |  | 0                       | 0    | 0     | 0   |  | 0                       | 0    | 0     | 0   |   |
| 8:30 AM                    | 0    | 0    | 0     | 0   | 0                          | 0    | 0     | 0   |  | 0                       | 0    | 0     | 0   |  | 0                       | 0    | 0     | 1   |   |
| 8:45 AM                    | 0    | 0    | 0     | 0   | 0                          | 0    | 0     | 0   |  | 0                       | 0    | 0     | 0   |  | 0                       | 0    | 0     | 0   |   |

| Chestnut Street Northbound |      |      |       |     | Chestnut Street Southbound |      |       |     |  | Elliot Street Eastbound |      |       |     |  | Elliot Street Westbound |      |       |     |  |
|----------------------------|------|------|-------|-----|----------------------------|------|-------|-----|--|-------------------------|------|-------|-----|--|-------------------------|------|-------|-----|--|
| Start Time                 | Left | Thru | Right | PED | Left                       | Thru | Right | PED |  | Left                    | Thru | Right | PED |  | Left                    | Thru | Right | PED |  |
| 4:00 PM                    | 0    | 0    | 0     | 0   | 0                          | 0    | 0     | 2   |  | 0                       | 1    | 0     | 1   |  | 0                       | 0    | 0     | 2   |  |
| 4:15 PM                    | 0    | 0    | 0     | 2   | 0                          | 0    | 0     | 2   |  | 0                       | 0    | 0     | 0   |  | 0                       | 0    | 0     | 2   |  |
| 4:30 PM                    | 0    | 0    | 0     | 1   | 0                          | 0    | 0     | 1   |  | 0                       | 0    | 0     | 2   |  | 0                       | 0    | 0     | 2   |  |
| 4:45 PM                    | 0    | 0    | 0     | 0   | 0                          | 0    | 0     | 0   |  | 0                       | 0    | 0     | 0   |  | 0                       | 0    | 0     | 0   |  |
| 5:00 PM                    | 0    | 0    | 0     | 0   | 0                          | 0    | 0     | 1   |  | 0                       | 0    | 0     | 0   |  | 0                       | 0    | 0     | 1   |  |
| 5:15 PM                    | 0    | 0    | 0     | 1   | 0                          | 0    | 0     | 0   |  | 0                       | 0    | 0     | 1   |  | 0                       | 0    | 0     | 2   |  |
| 5:30 PM                    | 0    | 0    | 0     | 1   | 0                          | 0    | 0     | 1   |  | 0                       | 0    | 0     | 2   |  | 0                       | 0    | 0     | 2   |  |
| 5:45 PM                    | 0    | 0    | 0     | 0   | 0                          | 0    | 0     | 0   |  | 0                       | 0    | 0     | 0   |  | 0                       | 0    | 0     | 0   |  |

| AM PEAK HOUR       |      |      |       |     | Chestnut Street Northbound |      |       |     |  | Chestnut Street Southbound |      |       |     |  | Elliot Street Eastbound |      |       |     |  | Elliot Street Westbound |      |       |     |  |
|--------------------|------|------|-------|-----|----------------------------|------|-------|-----|--|----------------------------|------|-------|-----|--|-------------------------|------|-------|-----|--|-------------------------|------|-------|-----|--|
| 7:45 AM to 8:45 AM | Left | Thru | Right | PED | Left                       | Thru | Right | PED |  | Left                       | Thru | Right | PED |  | Left                    | Thru | Right | PED |  | Left                    | Thru | Right | PED |  |
|                    | 0    | 0    | 0     | 1   | 0                          | 0    | 0     | 1   |  | 0                          | 0    | 0     | 1   |  | 0                       | 0    | 1     | 1   |  | 0                       | 0    | 0     | 2   |  |

| PM PEAK HOUR       |      |      |       |     | Chestnut Street Northbound |      |       |     |  | Chestnut Street Southbound |      |       |     |  | Elliot Street Eastbound |      |       |     |  | Elliot Street Westbound |      |       |     |  |
|--------------------|------|------|-------|-----|----------------------------|------|-------|-----|--|----------------------------|------|-------|-----|--|-------------------------|------|-------|-----|--|-------------------------|------|-------|-----|--|
| 4:45 PM to 5:45 PM | Left | Thru | Right | PED | Left                       | Thru | Right | PED |  | Left                       | Thru | Right | PED |  | Left                    | Thru | Right | PED |  | Left                    | Thru | Right | PED |  |
|                    | 0    | 0    | 0     | 2   | 0                          | 0    | 0     | 2   |  | 0                          | 0    | 0     | 2   |  | 0                       | 0    | 3     | 0   |  | 0                       | 0    | 0     | 5   |  |

\*Peak hours corresponds to vehicular peak hours.

11/6/2017, 8:09 AM, 12239.00\_127\_018\_TMC\_Loc 3

Client: Matt Duranleau  
Project #: 12239.00\_127\_018\_VHb  
BTD #: Location 4  
Location: Newton, MA  
Street 1: Chestnut Street  
Street 2: Oak Street  
Count Date: 10/26/2017  
Day of Week: Thursday  
Weather: Rainy, 55°F



TOTAL (CARS & TRUCKS)

| Oak Street Northbound |        |      |      |       | Oak Street Southbound |      |      |       |        | Chestnut Street Eastbound |      |       |        |      | Chestnut Street Westbound |       |  |  |  |
|-----------------------|--------|------|------|-------|-----------------------|------|------|-------|--------|---------------------------|------|-------|--------|------|---------------------------|-------|--|--|--|
| Start Time            | U-Turn | Left | Thru | Right | U-Turn                | Left | Thru | Right | U-Turn | Left                      | Thru | Right | U-Turn | Left | Thru                      | Right |  |  |  |
| 7:00 AM               | 0      | 17   | 9    | 5     | 0                     | 0    | 17   | 1     | 0      | 1                         | 4    | 44    | 0      | 3    | 1                         | 1     |  |  |  |
| 7:15 AM               | 0      | 26   | 17   | 7     | 0                     | 0    | 20   | 2     | 0      | 2                         | 6    | 45    | 0      | 5    | 2                         | 1     |  |  |  |
| 7:30 AM               | 0      | 51   | 24   | 8     | 0                     | 1    | 18   | 1     | 0      | 3                         | 8    | 69    | 0      | 7    | 3                         | 2     |  |  |  |
| 7:45 AM               | 0      | 49   | 30   | 10    | 0                     | 1    | 16   | 2     | 0      | 3                         | 7    | 64    | 0      | 9    | 4                         | 2     |  |  |  |
| 8:00 AM               | 0      | 57   | 35   | 11    | 0                     | 0    | 14   | 2     | 0      | 4                         | 6    | 79    | 0      | 10   | 5                         | 1     |  |  |  |
| 8:15 AM               | 0      | 70   | 34   | 10    | 0                     | 1    | 11   | 1     | 0      | 5                         | 8    | 66    | 0      | 9    | 4                         | 2     |  |  |  |
| 8:30 AM               | 0      | 64   | 31   | 9     | 0                     | 1    | 10   | 2     | 0      | 4                         | 7    | 68    | 0      | 8    | 3                         | 1     |  |  |  |
| 8:45 AM               | 0      | 58   | 24   | 8     | 0                     | 0    | 9    | 1     | 0      | 3                         | 6    | 78    | 0      | 7    | 2                         | 1     |  |  |  |

| Oak Street Northbound |        |      |      |       | Oak Street Southbound |      |      |       |        | Chestnut Street Eastbound |      |       |        |      | Chestnut Street Westbound |       |  |  |  |
|-----------------------|--------|------|------|-------|-----------------------|------|------|-------|--------|---------------------------|------|-------|--------|------|---------------------------|-------|--|--|--|
| Start Time            | U-Turn | Left | Thru | Right | U-Turn                | Left | Thru | Right | U-Turn | Left                      | Thru | Right | U-Turn | Left | Thru                      | Right |  |  |  |
| 4:00 PM               | 0      | 67   | 23   | 5     | 0                     | 0    | 27   | 3     | 0      | 1                         | 2    | 78    | 0      | 4    | 6                         | 0     |  |  |  |
| 4:15 PM               | 0      | 59   | 24   | 3     | 0                     | 1    | 30   | 6     | 0      | 1                         | 2    | 66    | 0      | 6    | 8                         | 1     |  |  |  |
| 4:30 PM               | 0      | 68   | 25   | 4     | 0                     | 0    | 31   | 6     | 0      | 3                         | 3    | 61    | 0      | 7    | 7                         | 1     |  |  |  |
| 4:45 PM               | 0      | 59   | 24   | 5     | 0                     | 1    | 32   | 5     | 0      | 4                         | 3    | 52    | 0      | 9    | 7                         | 0     |  |  |  |
| 5:00 PM               | 0      | 72   | 27   | 3     | 0                     | 2    | 33   | 4     | 0      | 6                         | 4    | 71    | 0      | 11   | 6                         | 1     |  |  |  |
| 5:15 PM               | 0      | 55   | 26   | 4     | 0                     | 2    | 31   | 3     | 0      | 7                         | 5    | 45    | 0      | 10   | 7                         | 2     |  |  |  |
| 5:30 PM               | 0      | 58   | 24   | 3     | 0                     | 1    | 26   | 4     | 0      | 6                         | 5    | 33    | 0      | 9    | 5                         | 1     |  |  |  |
| 5:45 PM               | 0      | 73   | 22   | 3     | 0                     | 1    | 28   | 3     | 0      | 5                         | 4    | 44    | 0      | 8    | 4                         | 1     |  |  |  |

| AM PEAK HOUR<br>7:45 AM<br>to<br>8:45 AM |  | Oak Street<br>Northbound |      |      |       | Oak Street<br>Southbound |      |      |       | Chestnut Street<br>Eastbound |      |      |       | Chestnut Street<br>Westbound |      |      |       |
|------------------------------------------|--|--------------------------|------|------|-------|--------------------------|------|------|-------|------------------------------|------|------|-------|------------------------------|------|------|-------|
|                                          |  | U-Turn                   | Left | Thru | Right | U-Turn                   | Left | Thru | Right | U-Turn                       | Left | Thru | Right | U-Turn                       | Left | Thru | Right |
| PHF                                      |  | 0.90                     |      |      |       | 0.80                     |      |      |       | 0.90                         |      |      |       | 0.91                         |      |      |       |
| HV %                                     |  | 0.0%                     | 1.3% | 0.8% | 0.0%  | 0.0%                     | 0.0% | 3.9% | 0.0%  | 0.0%                         | 0.0% | 0.0% | 0.7%  | 0.0%                         | 0.0% | 0.0% | 0.0%  |

| PM PEAK HOUR<br>4:15 PM<br>to<br>5:15 PM |  | Oak Street<br>Northbound |      |      |       | Oak Street<br>Southbound |      |      |       | Chestnut Street<br>Eastbound |      |      |       | Chestnut Street<br>Westbound |      |      |       |
|------------------------------------------|--|--------------------------|------|------|-------|--------------------------|------|------|-------|------------------------------|------|------|-------|------------------------------|------|------|-------|
|                                          |  | U-Turn                   | Left | Thru | Right | U-Turn                   | Left | Thru | Right | U-Turn                       | Left | Thru | Right | U-Turn                       | Left | Thru | Right |
|                                          |  | 0                        | 258  | 100  | 15    | 0                        | 4    | 126  | 21    | 0                            | 14   | 12   | 250   | 0                            | 33   | 28   | 3     |
| PHF                                      |  | 0.91                     |      |      |       | 0.97                     |      |      |       | 0.85                         |      |      |       | 0.89                         |      |      |       |
| HV %                                     |  | 0.0%                     | 0.4% | 1.0% | 0.0%  | 0.0%                     | 0.0% | 0.0% | 0.0%  | 0.0%                         | 0.0% | 0.0% | 0.4%  | 0.0%                         | 0.0% | 0.0% | 0.0%  |

11/6/2017, 8:16 AM, 12239.00\_127\_018\_TMC\_Loc 4

Client: Matt Duranleau  
Project #: 12239.00\_127\_018\_VHb  
BTD #: Location 4  
Location: Newton, MA  
Street 1: Chestnut Street  
Street 2: Oak Street  
Count Date: 10/26/2017  
Day of Week: Thursday  
Weather: Rainy, 55°F



#### TRUCKS

| Start Time | Oak Street Northbound |      |      |       | Oak Street Southbound |      |      |       | Chestnut Street Eastbound |      |      |       | Chestnut Street Westbound |      |      |       |
|------------|-----------------------|------|------|-------|-----------------------|------|------|-------|---------------------------|------|------|-------|---------------------------|------|------|-------|
|            | U-Turn                | Left | Thru | Right | U-Turn                | Left | Thru | Right | U-Turn                    | Left | Thru | Right | U-Turn                    | Left | Thru | Right |
| 7:00 AM    | 0                     | 1    | 0    | 0     | 0                     | 0    | 0    | 0     | 0                         | 0    | 0    | 0     | 0                         | 0    | 0    | 0     |
| 7:15 AM    | 0                     | 0    | 0    | 0     | 0                     | 0    | 0    | 0     | 0                         | 0    | 0    | 0     | 1                         | 0    | 0    | 0     |
| 7:30 AM    | 0                     | 0    | 1    | 0     | 0                     | 0    | 1    | 0     | 0                         | 0    | 1    | 0     | 0                         | 0    | 0    | 0     |
| 7:45 AM    | 0                     | 1    | 0    | 0     | 0                     | 0    | 1    | 0     | 0                         | 0    | 0    | 1     | 0                         | 0    | 0    | 0     |
| 8:00 AM    | 0                     | 1    | 0    | 0     | 0                     | 0    | 0    | 0     | 0                         | 0    | 0    | 0     | 0                         | 0    | 0    | 0     |
| 8:15 AM    | 0                     | 1    | 1    | 0     | 0                     | 0    | 1    | 0     | 0                         | 0    | 0    | 0     | 0                         | 0    | 0    | 0     |
| 8:30 AM    | 0                     | 0    | 0    | 0     | 0                     | 0    | 0    | 0     | 0                         | 0    | 0    | 1     | 0                         | 0    | 0    | 0     |
| 8:45 AM    | 0                     | 1    | 0    | 0     | 0                     | 0    | 0    | 0     | 0                         | 0    | 0    | 0     | 0                         | 0    | 0    | 0     |

| Start Time | Oak Street Northbound |      |      |       | Oak Street Southbound |      |      |       | Chestnut Street Eastbound |      |      |       | Chestnut Street Westbound |      |      |       |
|------------|-----------------------|------|------|-------|-----------------------|------|------|-------|---------------------------|------|------|-------|---------------------------|------|------|-------|
|            | U-Turn                | Left | Thru | Right | U-Turn                | Left | Thru | Right | U-Turn                    | Left | Thru | Right | U-Turn                    | Left | Thru | Right |
| 4:00 PM    | 0                     | 1    | 0    | 0     | 0                     | 0    | 0    | 0     | 0                         | 0    | 0    | 0     | 0                         | 0    | 0    | 0     |
| 4:15 PM    | 0                     | 0    | 0    | 0     | 0                     | 0    | 0    | 0     | 0                         | 0    | 0    | 0     | 0                         | 0    | 0    | 0     |
| 4:30 PM    | 0                     | 0    | 0    | 0     | 0                     | 0    | 0    | 0     | 0                         | 0    | 1    | 0     | 0                         | 0    | 0    | 0     |
| 4:45 PM    | 0                     | 1    | 0    | 0     | 0                     | 0    | 0    | 0     | 0                         | 0    | 0    | 0     | 0                         | 0    | 0    | 0     |
| 5:00 PM    | 0                     | 0    | 1    | 0     | 0                     | 0    | 0    | 0     | 0                         | 0    | 0    | 0     | 0                         | 0    | 0    | 0     |
| 5:15 PM    | 0                     | 0    | 0    | 0     | 0                     | 0    | 1    | 0     | 0                         | 0    | 0    | 0     | 0                         | 0    | 0    | 0     |
| 5:30 PM    | 0                     | 0    | 0    | 0     | 0                     | 0    | 0    | 0     | 0                         | 0    | 0    | 0     | 0                         | 0    | 0    | 0     |
| 5:45 PM    | 0                     | 0    | 0    | 0     | 0                     | 0    | 0    | 0     | 0                         | 0    | 0    | 0     | 0                         | 0    | 0    | 0     |

| AM PEAK HOUR       |  | Oak Street Northbound |      |      |       | Oak Street Southbound |      |      |       | Chestnut Street Eastbound |      |      |       | Chestnut Street Westbound |      |      |       |
|--------------------|--|-----------------------|------|------|-------|-----------------------|------|------|-------|---------------------------|------|------|-------|---------------------------|------|------|-------|
| 7:30 AM to 8:30 AM |  | U-Turn                | Left | Thru | Right | U-Turn                | Left | Thru | Right | U-Turn                    | Left | Thru | Right | U-Turn                    | Left | Thru | Right |
| PHF                |  | 0                     | 3    | 2    | 0     | 0                     | 0    | 3    | 0     | 0                         | 0    | 2    | 0     | 0                         | 0    | 0    | 0     |
|                    |  | 0.63                  |      |      |       | 0.75                  |      |      |       | 0.50                      |      |      |       | 0.00                      |      |      |       |

| PM PEAK HOUR       |  | Oak Street Northbound |      |      |       | Oak Street Southbound |      |      |       | Chestnut Street Eastbound |      |      |       | Chestnut Street Westbound |      |      |       |
|--------------------|--|-----------------------|------|------|-------|-----------------------|------|------|-------|---------------------------|------|------|-------|---------------------------|------|------|-------|
| 4:30 PM to 5:30 PM |  | U-Turn                | Left | Thru | Right | U-Turn                | Left | Thru | Right | U-Turn                    | Left | Thru | Right | U-Turn                    | Left | Thru | Right |
| PHF                |  | 0                     | 1    | 1    | 0     | 0                     | 0    | 1    | 0     | 0                         | 0    | 0    | 1     | 0                         | 0    | 0    | 0     |
|                    |  | 0.50                  |      |      |       | 0.25                  |      |      |       | 0.25                      |      |      |       | 0.00                      |      |      |       |

Client: Matt Duranleau  
Project #: 12239.00\_127\_018\_VHb  
BTD #: Location 4  
Location: Newton, MA  
Street 1: Chestnut Street  
Street 2: Oak Street  
Count Date: 10/26/2017  
Day of Week: Thursday  
Weather: Rainy, 55°F



#### PEDESTRIANS & BICYCLES

| Start Time | Oak Street Northbound |      |       |     | Oak Street Southbound |      |       |     | Chestnut Street Eastbound |      |       |     | Chestnut Street Westbound |      |       |     |
|------------|-----------------------|------|-------|-----|-----------------------|------|-------|-----|---------------------------|------|-------|-----|---------------------------|------|-------|-----|
|            | Left                  | Thru | Right | PED | Left                  | Thru | Right | PED | Left                      | Thru | Right | PED | Left                      | Thru | Right | PED |
| 7:00 AM    | 0                     | 0    | 0     | 0   | 0                     | 0    | 0     | 0   | 0                         | 0    | 0     | 0   | 0                         | 0    | 0     | 2   |
| 7:15 AM    | 0                     | 0    | 0     | 0   | 0                     | 0    | 0     | 0   | 0                         | 0    | 0     | 0   | 0                         | 0    | 0     | 0   |
| 7:30 AM    | 0                     | 0    | 0     | 0   | 0                     | 0    | 0     | 0   | 0                         | 0    | 0     | 1   | 0                         | 0    | 0     | 2   |
| 7:45 AM    | 0                     | 0    | 0     | 1   | 0                     | 0    | 0     | 1   | 0                         | 0    | 0     | 0   | 0                         | 0    | 0     | 1   |
| 8:00 AM    | 0                     | 0    | 0     | 0   | 0                     | 0    | 0     | 0   | 0                         | 0    | 0     | 2   | 0                         | 0    | 0     | 1   |
| 8:15 AM    | 0                     | 0    | 0     | 0   | 0                     | 1    | 0     | 1   | 0                         | 0    | 0     | 3   | 0                         | 0    | 0     | 4   |
| 8:30 AM    | 0                     | 0    | 0     | 0   | 0                     | 0    | 0     | 0   | 0                         | 0    | 0     | 0   | 0                         | 0    | 0     | 1   |
| 8:45 AM    | 0                     | 0    | 0     | 0   | 0                     | 0    | 0     | 0   | 0                         | 0    | 0     | 1   | 0                         | 0    | 0     | 0   |

| Start Time | Oak Street Northbound |      |       |     | Oak Street Southbound |      |       |     | Chestnut Street Eastbound |      |       |     | Chestnut Street Westbound |      |       |     |
|------------|-----------------------|------|-------|-----|-----------------------|------|-------|-----|---------------------------|------|-------|-----|---------------------------|------|-------|-----|
|            | Left                  | Thru | Right | PED | Left                  | Thru | Right | PED | Left                      | Thru | Right | PED | Left                      | Thru | Right | PED |
| 4:00 PM    | 0                     | 0    | 0     | 0   | 0                     | 0    | 0     | 0   | 0                         | 0    | 0     | 0   | 0                         | 0    | 0     | 1   |
| 4:15 PM    | 0                     | 0    | 0     | 1   | 0                     | 0    | 0     | 1   | 0                         | 0    | 0     | 2   | 0                         | 0    | 0     | 1   |
| 4:30 PM    | 0                     | 0    | 0     | 0   | 0                     | 0    | 1     | 0   | 0                         | 0    | 1     | 0   | 0                         | 0    | 0     | 2   |
| 4:45 PM    | 0                     | 0    | 0     | 2   | 0                     | 0    | 0     | 0   | 0                         | 0    | 0     | 2   | 0                         | 0    | 0     | 1   |
| 5:00 PM    | 0                     | 0    | 0     | 1   | 0                     | 0    | 0     | 0   | 0                         | 0    | 0     | 0   | 0                         | 0    | 0     | 0   |
| 5:15 PM    | 0                     | 0    | 0     | 0   | 0                     | 0    | 0     | 1   | 0                         | 0    | 0     | 1   | 0                         | 0    | 0     | 1   |
| 5:30 PM    | 0                     | 0    | 0     | 1   | 0                     | 0    | 0     | 0   | 0                         | 0    | 0     | 1   | 0                         | 0    | 0     | 0   |
| 5:45 PM    | 0                     | 0    | 0     | 0   | 0                     | 0    | 0     | 0   | 0                         | 0    | 0     | 0   | 0                         | 0    | 0     | 1   |

| AM PEAK HOUR       |  | Oak Street Northbound |      |       |     | Oak Street Southbound |      |       |     | Chestnut Street Eastbound |      |       |     | Chestnut Street Westbound |      |       |     |
|--------------------|--|-----------------------|------|-------|-----|-----------------------|------|-------|-----|---------------------------|------|-------|-----|---------------------------|------|-------|-----|
| 7:45 AM to 8:45 AM |  | Left                  | Thru | Right | PED | Left                  | Thru | Right | PED | Left                      | Thru | Right | PED | Left                      | Thru | Right | PED |
|                    |  | 0                     | 0    | 0     | 1   | 0                     | 1    | 0     | 2   | 0                         | 0    | 0     | 5   | 0                         | 0    | 0     | 7   |

| PM PEAK HOUR       |  | Oak Street Northbound |      |       |     | Oak Street Southbound |      |       |     | Chestnut Street Eastbound |      |       |     | Chestnut Street Westbound |      |       |     |
|--------------------|--|-----------------------|------|-------|-----|-----------------------|------|-------|-----|---------------------------|------|-------|-----|---------------------------|------|-------|-----|
| 4:15 PM to 5:15 PM |  | Left                  | Thru | Right | PED | Left                  | Thru | Right | PED | Left                      | Thru | Right | PED | Left                      | Thru | Right | PED |
|                    |  | 0                     | 0    | 0     | 4   | 0                     | 0    | 0     | 2   | 0                         | 0    | 0     | 5   | 0                         | 0    | 0     | 4   |

\*Peak hour corresponds to vehicular peak hours.

Client: Matt Duranleau  
Project #: 12239.00\_127\_018\_VHb  
BTD #: Location 5  
Location: Newton, MA  
Street 1: Oak Street  
Street 2: Old Clarks Driveway  
Count Date: 10/26/2017  
Day of Week: Thursday  
Weather: Rainy, 55°F



**TOTAL (CARS & TRUCKS)**

| Oak Street     |        |      |      |       |                |      |      |       |        | Old Clarks Driveway |      |       |        |      |                |       |  |  |  |
|----------------|--------|------|------|-------|----------------|------|------|-------|--------|---------------------|------|-------|--------|------|----------------|-------|--|--|--|
| Northwestbound |        |      |      |       | Southeastbound |      |      |       |        | Northeastbound      |      |       |        |      | Southwestbound |       |  |  |  |
| Start Time     | U-Turn | Left | Thru | Right | U-Turn         | Left | Thru | Right | U-Turn | Left                | Thru | Right | U-Turn | Left | Thru           | Right |  |  |  |
| 7:00 AM        | 0      | 0    | 34   | 3     | 0              | 0    | 64   | 0     | 0      | 0                   | 0    | 0     | 0      | 0    | 0              | 0     |  |  |  |
| 7:15 AM        | 0      | 0    | 49   | 1     | 0              | 0    | 70   | 0     | 0      | 0                   | 0    | 0     | 0      | 0    | 0              | 1     |  |  |  |
| 7:30 AM        | 0      | 0    | 81   | 1     | 0              | 1    | 93   | 0     | 0      | 0                   | 0    | 0     | 0      | 0    | 1              | 2     |  |  |  |
| 7:45 AM        | 0      | 0    | 88   | 0     | 0              | 1    | 88   | 0     | 0      | 0                   | 0    | 0     | 0      | 0    | 0              | 1     |  |  |  |
| 8:00 AM        | 0      | 0    | 103  | 0     | 0              | 0    | 103  | 0     | 0      | 0                   | 0    | 0     | 0      | 0    | 0              | 0     |  |  |  |
| 8:15 AM        | 0      | 0    | 113  | 0     | 0              | 0    | 86   | 0     | 0      | 0                   | 0    | 0     | 0      | 0    | 1              | 1     |  |  |  |
| 8:30 AM        | 0      | 0    | 104  | 1     | 0              | 1    | 83   | 0     | 0      | 0                   | 0    | 0     | 0      | 0    | 1              | 0     |  |  |  |
| 8:45 AM        | 0      | 0    | 90   | 0     | 0              | 0    | 97   | 0     | 0      | 0                   | 0    | 0     | 0      | 0    | 0              | 0     |  |  |  |

| Oak Street Northwestbound |        |      |      |       | Oak Street Southeastbound |      |      |       |        | Northeastbound |      |       |        |      | Old Clarks Driveway Southwestbound |       |  |  |  |
|---------------------------|--------|------|------|-------|---------------------------|------|------|-------|--------|----------------|------|-------|--------|------|------------------------------------|-------|--|--|--|
| Start Time                | U-Turn | Left | Thru | Right | U-Turn                    | Left | Thru | Right | U-Turn | Left           | Thru | Right | U-Turn | Left | Thru                               | Right |  |  |  |
| 4:00 PM                   | 0      | 0    | 95   | 0     | 0                         | 0    | 109  | 0     | 0      | 0              | 0    | 0     | 0      | 0    | 0                                  | 0     |  |  |  |
| 4:15 PM                   | 0      | 0    | 86   | 0     | 0                         | 0    | 102  | 0     | 0      | 0              | 0    | 0     | 0      | 0    | 0                                  | 0     |  |  |  |
| 4:30 PM                   | 0      | 0    | 97   | 0     | 0                         | 0    | 99   | 0     | 0      | 0              | 0    | 0     | 0      | 0    | 0                                  | 0     |  |  |  |
| 4:45 PM                   | 0      | 0    | 88   | 1     | 0                         | 0    | 93   | 0     | 0      | 0              | 0    | 0     | 0      | 1    | 0                                  | 0     |  |  |  |
| 5:00 PM                   | 0      | 0    | 102  | 0     | 0                         | 1    | 114  | 0     | 0      | 0              | 0    | 0     | 0      | 0    | 0                                  | 0     |  |  |  |
| 5:15 PM                   | 0      | 0    | 84   | 0     | 0                         | 0    | 86   | 0     | 0      | 0              | 0    | 0     | 0      | 0    | 0                                  | 1     |  |  |  |
| 5:30 PM                   | 0      | 0    | 85   | 0     | 0                         | 0    | 63   | 0     | 0      | 0              | 0    | 0     | 0      | 0    | 0                                  | 0     |  |  |  |
| 5:45 PM                   | 0      | 0    | 98   | 0     | 0                         | 0    | 86   | 0     | 0      | 0              | 0    | 0     | 0      | 0    | 0                                  | 0     |  |  |  |

| Oak Street Northwestbound |      |      |       | Oak Street Southeastbound |      |      |       | Old Clarks Driveway Northeastbound |      |      |       | Old Clarks Driveway Southwestbound |      |      |       |
|---------------------------|------|------|-------|---------------------------|------|------|-------|------------------------------------|------|------|-------|------------------------------------|------|------|-------|
| U-Turn                    | Left | Thru | Right | U-Turn                    | Left | Thru | Right | U-Turn                             | Left | Thru | Right | U-Turn                             | Left | Thru | Right |
| 0                         | 0    | 410  | 1     | 0                         | 1    | 369  | 0     | 0                                  | 0    | 0    | 0     | 2                                  | 1    | 0    | 1     |
| PHF                       |      |      |       | 0.91                      |      |      |       | 0.90                               |      |      |       | 0.00                               |      |      |       |
| HV %                      |      |      |       | 0.0%                      | 0.0% | 1.0% | 0.0%  | 0.0%                               | 0.0% | 0.5% | 0.0%  | 0.0%                               | 0.0% | 0.0% | 0.0%  |

| Oak Street Northwestbound |      |      |       | Oak Street Southeastbound |      |      |       | Old Clarks Driveway Northeastbound |      |      |       | Old Clarks Driveway Southwestbound |      |      |       |
|---------------------------|------|------|-------|---------------------------|------|------|-------|------------------------------------|------|------|-------|------------------------------------|------|------|-------|
| U-Turn                    | Left | Thru | Right | U-Turn                    | Left | Thru | Right | U-Turn                             | Left | Thru | Right | U-Turn                             | Left | Thru | Right |
| 0                         | 0    | 373  | 1     | 0                         | 1    | 468  | 0     | 0                                  | 0    | 0    | 0     | 1                                  | 0    | 0    | 0     |
| PHF                       |      |      |       | 0.92                      |      |      |       | 0.89                               |      |      |       | 0.00                               |      |      |       |
| HV %                      |      |      |       | 0.0%                      | 0.0% | 0.5% | 0.0%  | 0.0%                               | 0.0% | 0.2% | 0.0%  | 0.0%                               | 0.0% | 0.0% | 0.0%  |

11/6/2017, 8:19 AM, 12239.00\_127\_018\_TMC\_Loc 5

Client: Matt Duranleau  
Project #: 12239.00\_127\_018\_VHb  
BTD #: Location 5  
Location: Newton, MA  
Street 1: Oak Street  
Street 2: Old Clarks Driveway  
Count Date: 10/26/2017  
Day of Week: Thursday  
Weather: Rainy, 55°F



**TRUCKS**

| Oak Street Northwestbound |        |      |      | Oak Street Southeastbound |        |      |      | Northeastbound |        |      |      | Old Clarks Driveway Southwestbound |        |      |      |       |
|---------------------------|--------|------|------|---------------------------|--------|------|------|----------------|--------|------|------|------------------------------------|--------|------|------|-------|
| Start Time                | U-Turn | Left | Thru | Right                     | U-Turn | Left | Thru | Right          | U-Turn | Left | Thru | Right                              | U-Turn | Left | Thru | Right |
| 7:00 AM                   | 0      | 0    | 1    | 0                         | 0      | 0    | 0    | 0              | 0      | 0    | 0    | 0                                  | 0      | 0    | 0    | 0     |
| 7:15 AM                   | 0      | 0    | 0    | 0                         | 0      | 0    | 1    | 0              | 0      | 0    | 0    | 0                                  | 0      | 0    | 0    | 0     |
| 7:30 AM                   | 0      | 0    | 1    | 0                         | 0      | 0    | 2    | 0              | 0      | 0    | 0    | 0                                  | 0      | 0    | 0    | 0     |
| 7:45 AM                   | 0      | 0    | 1    | 0                         | 0      | 0    | 2    | 0              | 0      | 0    | 0    | 0                                  | 0      | 0    | 0    | 0     |
| 8:00 AM                   | 0      | 0    | 1    | 0                         | 0      | 0    | 0    | 0              | 0      | 0    | 0    | 0                                  | 0      | 0    | 0    | 0     |
| 8:15 AM                   | 0      | 0    | 2    | 0                         | 0      | 0    | 1    | 0              | 0      | 0    | 0    | 0                                  | 0      | 0    | 0    | 0     |
| 8:30 AM                   | 0      | 0    | 0    | 0                         | 0      | 1    | 0    | 0              | 0      | 0    | 0    | 0                                  | 0      | 0    | 0    | 0     |
| 8:45 AM                   | 0      | 0    | 1    | 0                         | 0      | 0    | 0    | 0              | 0      | 0    | 0    | 0                                  | 0      | 0    | 0    | 0     |

| Oak Street Northwestbound |        |      |      |       | Oak Street Southeastbound |      |      |       |        | Old Clarks Driveway Northeastbound |      |       |        |      | Old Clarks Driveway Southwestbound |       |  |  |  |
|---------------------------|--------|------|------|-------|---------------------------|------|------|-------|--------|------------------------------------|------|-------|--------|------|------------------------------------|-------|--|--|--|
| Start Time                | U-Turn | Left | Thru | Right | U-Turn                    | Left | Thru | Right | U-Turn | Left                               | Thru | Right | U-Turn | Left | Thru                               | Right |  |  |  |
| 4:00 PM                   | 0      | 0    | 1    | 0     | 0                         | 0    | 0    | 0     | 0      | 0                                  | 0    | 0     | 0      | 0    | 0                                  | 0     |  |  |  |
| 4:15 PM                   | 0      | 0    | 0    | 0     | 0                         | 0    | 0    | 0     | 0      | 0                                  | 0    | 0     | 0      | 0    | 0                                  | 0     |  |  |  |
| 4:30 PM                   | 0      | 0    | 0    | 0     | 0                         | 0    | 1    | 0     | 0      | 0                                  | 0    | 0     | 0      | 0    | 0                                  | 0     |  |  |  |
| 4:45 PM                   | 0      | 0    | 1    | 0     | 0                         | 0    | 0    | 0     | 0      | 0                                  | 0    | 0     | 0      | 0    | 0                                  | 0     |  |  |  |
| 5:00 PM                   | 0      | 0    | 1    | 0     | 0                         | 0    | 0    | 0     | 0      | 0                                  | 0    | 0     | 0      | 0    | 0                                  | 0     |  |  |  |
| 5:15 PM                   | 0      | 0    | 0    | 0     | 0                         | 0    | 1    | 0     | 0      | 0                                  | 0    | 0     | 0      | 0    | 0                                  | 0     |  |  |  |
| 5:30 PM                   | 0      | 0    | 0    | 0     | 0                         | 0    | 0    | 0     | 0      | 0                                  | 0    | 0     | 0      | 0    | 0                                  | 0     |  |  |  |
| 5:45 PM                   | 0      | 0    | 0    | 0     | 0                         | 0    | 0    | 0     | 0      | 0                                  | 0    | 0     | 0      | 0    | 0                                  | 0     |  |  |  |

| Oak Street Northwestbound |      |      |       | Oak Street Southeastbound |      |      |       | Old Clarks Driveway Northeastbound |      |      |       | Old Clarks Driveway Southwestbound |      |      |       |
|---------------------------|------|------|-------|---------------------------|------|------|-------|------------------------------------|------|------|-------|------------------------------------|------|------|-------|
| U-Turn                    | Left | Thru | Right | U-Turn                    | Left | Thru | Right | U-Turn                             | Left | Thru | Right | U-Turn                             | Left | Thru | Right |
| 0                         | 0    | 5    | 0     | 0                         | 0    | 5    | 0     | 0                                  | 0    | 0    | 0     | 0                                  | 0    | 0    | 0     |
| PHF                       |      |      |       | 0.63                      |      |      |       | 0.63                               |      |      |       | 0.00                               |      |      |       |

| Oak Street Northwestbound |      |      |       | Oak Street Southeastbound |      |      |       | Old Clarks Driveway Northeastbound |      |      |       | Old Clarks Driveway Southwestbound |      |      |       |
|---------------------------|------|------|-------|---------------------------|------|------|-------|------------------------------------|------|------|-------|------------------------------------|------|------|-------|
| U-Turn                    | Left | Thru | Right | U-Turn                    | Left | Thru | Right | U-Turn                             | Left | Thru | Right | U-Turn                             | Left | Thru | Right |
| 0                         | 0    | 2    | 0     | 0                         | 0    | 2    | 0     | 0                                  | 0    | 0    | 0     | 0                                  | 0    | 0    | 0     |
| PHF                       |      |      |       | 0.50                      |      |      |       | 0.50                               |      |      |       | 0.00                               |      |      |       |

11/6/2017, 8:19 AM, 12239.00\_127\_018\_TMC\_Loc 5

Client: Matt Duranleau  
Project #: 12239.00\_127\_018\_VHb  
BTD #: Location 5  
Location: Newton, MA  
Street 1: Oak Street  
Street 2: Old Clarks Driveway  
Count Date: 10/26/2017  
Day of Week: Thursday  
Weather: Rainy, 55°F



PEDESTRIANS & BICYCLES

| Oak Street<br>Northbound |      |      |       |     | Oak Street<br>Southbound |      |      |       |     | Northeastbound |      |      |       |     | Old Clarks Driveway<br>Southbound |      |      |       |     |
|--------------------------|------|------|-------|-----|--------------------------|------|------|-------|-----|----------------|------|------|-------|-----|-----------------------------------|------|------|-------|-----|
| Start Time               | Left | Thru | Right | PED | Start Time               | Left | Thru | Right | PED | Start Time     | Left | Thru | Right | PED | Start Time                        | Left | Thru | Right | PED |
| 7:00 AM                  | 0    | 0    | 0     | 0   | 0                        | 0    | 0    | 0     | 0   | 0              | 0    | 0    | 0     | 0   | 0                                 | 0    | 0    | 0     | 1   |
| 7:15 AM                  | 0    | 0    | 0     | 0   | 0                        | 0    | 0    | 0     | 0   | 0              | 0    | 0    | 0     | 0   | 0                                 | 0    | 0    | 0     | 0   |
| 7:30 AM                  | 0    | 0    | 0     | 0   | 0                        | 0    | 0    | 0     | 0   | 0              | 0    | 0    | 0     | 0   | 0                                 | 0    | 0    | 0     | 0   |
| 7:45 AM                  | 0    | 0    | 0     | 0   | 0                        | 0    | 0    | 0     | 0   | 0              | 0    | 0    | 0     | 0   | 0                                 | 0    | 0    | 0     | 1   |
| 8:00 AM                  | 0    | 0    | 0     | 0   | 0                        | 0    | 0    | 0     | 0   | 0              | 0    | 0    | 0     | 0   | 0                                 | 0    | 0    | 0     | 0   |
| 8:15 AM                  | 0    | 1    | 0     | 0   | 0                        | 0    | 0    | 0     | 0   | 0              | 0    | 0    | 0     | 0   | 0                                 | 0    | 0    | 0     | 0   |
| 8:30 AM                  | 0    | 0    | 0     | 3   | 0                        | 0    | 1    | 0     | 0   | 0              | 0    | 0    | 0     | 0   | 0                                 | 0    | 0    | 0     | 2   |
| 8:45 AM                  | 0    | 0    | 0     | 1   | 0                        | 0    | 0    | 0     | 0   | 0              | 0    | 0    | 0     | 0   | 0                                 | 0    | 0    | 0     | 0   |

| Oak Street<br>Northbound |      |      |       |     | Oak Street<br>Southbound |      |      |       |     | Northeastbound |      |      |       |     | Old Clarks Driveway<br>Southbound |      |      |       |     |
|--------------------------|------|------|-------|-----|--------------------------|------|------|-------|-----|----------------|------|------|-------|-----|-----------------------------------|------|------|-------|-----|
| Start Time               | Left | Thru | Right | PED | Start Time               | Left | Thru | Right | PED | Start Time     | Left | Thru | Right | PED | Start Time                        | Left | Thru | Right | PED |
| 4:00 PM                  | 0    | 0    | 0     | 1   | 0                        | 0    | 0    | 0     | 0   | 0              | 0    | 0    | 0     | 0   | 0                                 | 0    | 0    | 0     | 1   |
| 4:15 PM                  | 0    | 0    | 0     | 0   | 0                        | 0    | 0    | 0     | 0   | 0              | 0    | 0    | 0     | 0   | 0                                 | 0    | 0    | 0     | 1   |
| 4:30 PM                  | 0    | 0    | 0     | 0   | 0                        | 0    | 0    | 0     | 0   | 0              | 0    | 0    | 0     | 0   | 0                                 | 0    | 0    | 0     | 3   |
| 4:45 PM                  | 0    | 1    | 0     | 0   | 0                        | 0    | 0    | 0     | 0   | 0              | 0    | 0    | 0     | 0   | 0                                 | 0    | 0    | 0     | 1   |
| 5:00 PM                  | 0    | 0    | 0     | 0   | 0                        | 0    | 0    | 0     | 0   | 0              | 0    | 0    | 0     | 0   | 0                                 | 0    | 0    | 0     | 2   |
| 5:15 PM                  | 0    | 1    | 0     | 0   | 0                        | 0    | 1    | 0     | 0   | 0              | 0    | 0    | 0     | 0   | 0                                 | 0    | 0    | 0     | 0   |
| 5:30 PM                  | 0    | 0    | 0     | 0   | 0                        | 0    | 0    | 0     | 0   | 0              | 0    | 0    | 0     | 0   | 0                                 | 0    | 0    | 0     | 1   |
| 5:45 PM                  | 0    | 0    | 0     | 0   | 0                        | 0    | 0    | 0     | 0   | 0              | 0    | 0    | 0     | 0   | 0                                 | 0    | 0    | 0     | 0   |

| AM PEAK HOUR<br>8:00 AM<br>to<br>9:00 AM | Oak Street<br>Northbound |      |       |     | Oak Street<br>Southbound |      |       |     | Northeastbound |      |       |     | Old Clarks Driveway<br>Southbound |      |       |     |
|------------------------------------------|--------------------------|------|-------|-----|--------------------------|------|-------|-----|----------------|------|-------|-----|-----------------------------------|------|-------|-----|
|                                          | Left                     | Thru | Right | PED | Left                     | Thru | Right | PED | Left           | Thru | Right | PED | Left                              | Thru | Right | PED |
|                                          | 0                        | 1    | 0     | 4   | 0                        | 0    | 2     | 0   | 0              | 0    | 0     | 0   | 0                                 | 0    | 0     | 0   |

| PM PEAK HOUR<br>4:15 PM<br>to<br>5:15 PM | Oak Street<br>Northwestbound |      |       |     | Oak Street<br>Southbound |      |       |     | Northeastbound |      |       |     | Old Clarks Driveway<br>Southwestbound |      |       |     |
|------------------------------------------|------------------------------|------|-------|-----|--------------------------|------|-------|-----|----------------|------|-------|-----|---------------------------------------|------|-------|-----|
|                                          | Left                         | Thru | Right | PED | Left                     | Thru | Right | PED | Left           | Thru | Right | PED | Left                                  | Thru | Right | PED |
|                                          | 0                            | 1    | 0     | 0   | 0                        | 1    | 0     | 0   | 0              | 0    | 0     | 0   | 0                                     | 0    | 0     | 7   |

\*Peak hours corresponds to vehicular peak hours.

Client: Matt Duranleau  
Project #: 12239.00\_127\_018\_VHb  
BTD #: Location 6  
Location: Newton, MA  
Street 1: Needham Street  
Street 2: Mill Driveway  
Count Date: 10/26/2017  
Day of Week: Thursday  
Weather: Rainy, 55°F



TOTAL (CARS & TRUCKS)

| Needham Street<br>Northbound |        |      |      |       | Needham Street<br>Southbound |        |      |      |       | Mill Driveway<br>Eastbound |        |      |      |       | Westbound  |        |      |      |       |
|------------------------------|--------|------|------|-------|------------------------------|--------|------|------|-------|----------------------------|--------|------|------|-------|------------|--------|------|------|-------|
| Start Time                   | U-Turn | Left | Thru | Right | Start Time                   | U-Turn | Left | Thru | Right | Start Time                 | U-Turn | Left | Thru | Right | Start Time | U-Turn | Left | Thru | Right |
| 7:00 AM                      | 0      | 0    | 142  | 0     | 0                            | 0      | 85   | 0    | 0     | 0                          | 0      | 0    | 0    | 0     | 0          | 0      | 0    | 0    | 0     |
| 7:15 AM                      | 0      | 0    | 150  | 0     | 0                            | 0      | 95   | 0    | 0     | 0                          | 0      | 0    | 0    | 0     | 0          | 0      | 0    | 0    | 0     |
| 7:30 AM                      | 0      | 0    | 156  | 0     | 0                            | 0      | 117  | 0    | 0     | 0                          | 0      | 0    | 0    | 0     | 0          | 0      | 0    | 0    | 0     |
| 7:45 AM                      | 0      | 0    | 169  | 0     | 0                            | 0      | 136  | 0    | 0     | 0                          | 0      | 0    | 0    | 0     | 0          | 0      | 0    | 0    | 0     |
| 8:00 AM                      | 0      | 0    | 173  | 0     | 0                            | 0      | 153  | 0    | 0     | 0                          | 0      | 0    | 0    | 0     | 0          | 0      | 0    | 0    | 0     |
| 8:15 AM                      | 0      | 0    | 170  | 0     | 0                            | 0      | 163  | 0    | 0     | 0                          | 0      | 0    | 0    | 0     | 0          | 0      | 0    | 0    | 0     |
| 8:30 AM                      | 0      | 0    | 167  | 0     | 0                            | 0      | 157  | 0    | 0     | 0                          | 0      | 0    | 0    | 0     | 0          | 0      | 0    | 0    | 0     |
| 8:45 AM                      | 0      | 0    | 163  | 0     | 0                            | 0      | 149  | 0    | 0     | 0                          | 0      | 0    | 0    | 0     | 0          | 0      | 0    | 0    | 0     |

| Needham Street<br>Northbound |        |      |      |       | Needham Street<br>Southbound |        |      |      |       | Mill Driveway<br>Eastbound |        |      |      |       | Westbound  |        |      |      |       |
|------------------------------|--------|------|------|-------|------------------------------|--------|------|------|-------|----------------------------|--------|------|------|-------|------------|--------|------|------|-------|
| Start Time                   | U-Turn | Left | Thru | Right | Start Time                   | U-Turn | Left | Thru | Right | Start Time                 | U-Turn | Left | Thru | Right | Start Time | U-Turn | Left | Thru | Right |
| 4:00 PM                      | 0      | 0    | 170  | 0     | 0                            | 0      | 179  | 0    | 0     | 0                          | 0      | 0    | 0    | 0     | 0          | 0      | 0    | 0    | 0     |
| 4:15 PM                      | 0      | 0    | 176  | 0     | 0                            | 0      | 195  | 0    | 0     | 0                          | 0      | 0    | 0    | 0     | 0          | 0      | 0    | 0    | 0     |
| 4:30 PM                      | 0      | 0    | 175  | 0     | 0                            | 0      | 193  | 0    | 0     | 0                          | 0      | 0    | 0    | 0     | 0          | 0      | 0    | 0    | 0     |
| 4:45 PM                      | 0      | 0    | 183  | 0     | 0                            | 0      | 186  | 0    | 0     | 0                          | 0      | 0    | 0    | 0     | 0          | 0      | 0    | 0    | 0     |
| 5:00 PM                      | 0      | 0    | 184  | 0     | 0                            | 0      | 174  | 0    | 0     | 0                          | 0      | 0    | 0    | 0     | 0          | 0      | 0    | 0    | 0     |
| 5:15 PM                      | 0      | 0    | 190  | 0     | 0                            | 0      | 153  | 0    | 0     | 0                          | 0      | 0    | 0    | 0     | 0          | 0      | 0    | 0    | 0     |
| 5:30 PM                      | 0      | 0    | 181  | 0     | 0                            | 0      | 151  | 0    | 0     | 0                          | 0      | 0    | 0    | 0     | 0          | 0      | 0    | 0    | 0     |
| 5:45 PM                      | 0      | 0    | 178  | 0     | 0                            | 0      | 160  | 0    | 0     | 0                          | 0      | 0    | 0    | 0     | 0          | 0      | 0    | 0    | 0     |

| AM PEAK HOUR<br>8:00 AM<br>to<br>9:00 AM<br><br>PHF<br>HV % | Needham Street<br>Northbound |      |      |       | Needham Street<br>Southbound |      |      |       | Mill Driveway<br>Eastbound |      |      |       | Westbound |      |      |       |
|-------------------------------------------------------------|------------------------------|------|------|-------|------------------------------|------|------|-------|----------------------------|------|------|-------|-----------|------|------|-------|
|                                                             | U-Turn                       | Left | Thru | Right | U-Turn                       | Left | Thru | Right | U-Turn                     | Left | Thru | Right | U-Turn    | Left | Thru | Right |
|                                                             | 0                            | 0    | 673  | 0     | 0                            | 0    | 622  | 0     | 0                          | 0    | 0    | 0     | 0         | 0    | 0    | 0     |
|                                                             | 0.97                         |      |      |       | 0.95                         |      |      |       | 0.00                       |      |      |       | 0.00      |      |      |       |
|                                                             | 0.0%                         | 0.0% | 1.5% | 0.0%  | 0.0%                         | 0.0% | 2.3% | 0.0%  | 0.0%                       | 0.0% | 0.0% | 0.0%  | 0.0%      | 0.0% | 0.0% | 0.0%  |

| PM PEAK HOUR<br>4:15 PM<br>to<br>5:15 PM<br><br>PHF<br>HV % | Needham Street<br>Northbound |      |      |       | Needham Street<br>Southbound |      |      |       | Mill Driveway<br>Eastbound |      |      |       | Westbound |      |      |       |
|-------------------------------------------------------------|------------------------------|------|------|-------|------------------------------|------|------|-------|----------------------------|------|------|-------|-----------|------|------|-------|
|                                                             | U-Turn                       | Left | Thru | Right | U-Turn                       | Left | Thru | Right | U-Turn                     | Left | Thru | Right | U-Turn    | Left | Thru | Right |
|                                                             | 0                            | 0    | 718  | 0     | 0                            | 0    | 748  | 0     | 0                          | 0    | 0    | 0     | 0         | 0    | 0    | 0     |
|                                                             | 0.98                         |      |      |       | 0.96                         |      |      |       | 0.00                       |      |      |       | 0.00      |      |      |       |
|                                                             | 0.0%                         | 0.0% | 0.6% | 0.0%  | 0.0%                         | 0.0% | 0.7% | 0.0%  | 0.0%                       | 0.0% | 0.0% | 0.0%  | 0.0%      | 0.0% | 0.0% | 0.0%  |

Client: Matt Duranleau  
Project #: 12239.00\_127\_018\_VHb  
BTD #: Location 6  
Location: Newton, MA  
Street 1: Needham Street  
Street 2: Mill Driveway  
Count Date: 10/26/2017  
Day of Week: Thursday  
Weather: Rainy, 55°F



#### TRUCKS

| Start Time | Needham Street Northbound |      |      |       | Needham Street Southbound |      |      |       | Mill Driveway Eastbound |      |      |       | Westbound |      |      |       |
|------------|---------------------------|------|------|-------|---------------------------|------|------|-------|-------------------------|------|------|-------|-----------|------|------|-------|
|            | U-Turn                    | Left | Thru | Right | U-Turn                    | Left | Thru | Right | U-Turn                  | Left | Thru | Right | U-Turn    | Left | Thru | Right |
| 7:00 AM    | 0                         | 0    | 1    | 0     | 0                         | 0    | 3    | 0     | 0                       | 0    | 0    | 0     | 0         | 0    | 0    | 0     |
| 7:15 AM    | 0                         | 0    | 2    | 0     | 0                         | 0    | 2    | 0     | 0                       | 0    | 0    | 0     | 0         | 0    | 0    | 0     |
| 7:30 AM    | 0                         | 0    | 3    | 0     | 0                         | 0    | 2    | 0     | 0                       | 0    | 0    | 0     | 0         | 0    | 0    | 0     |
| 7:45 AM    | 0                         | 0    | 2    | 0     | 0                         | 0    | 3    | 0     | 0                       | 0    | 0    | 0     | 0         | 0    | 0    | 0     |
| 8:00 AM    | 0                         | 0    | 3    | 0     | 0                         | 0    | 6    | 0     | 0                       | 0    | 0    | 0     | 0         | 0    | 0    | 0     |
| 8:15 AM    | 0                         | 0    | 2    | 0     | 0                         | 0    | 3    | 0     | 0                       | 0    | 0    | 0     | 0         | 0    | 0    | 0     |
| 8:30 AM    | 0                         | 0    | 3    | 0     | 0                         | 0    | 2    | 0     | 0                       | 0    | 0    | 0     | 0         | 0    | 0    | 0     |
| 8:45 AM    | 0                         | 0    | 2    | 0     | 0                         | 0    | 3    | 0     | 0                       | 0    | 0    | 0     | 0         | 0    | 0    | 0     |

| Start Time | Needham Street Northbound |      |      |       | Needham Street Southbound |      |      |       | Mill Driveway Eastbound |      |      |       | Westbound |      |      |       |
|------------|---------------------------|------|------|-------|---------------------------|------|------|-------|-------------------------|------|------|-------|-----------|------|------|-------|
|            | U-Turn                    | Left | Thru | Right | U-Turn                    | Left | Thru | Right | U-Turn                  | Left | Thru | Right | U-Turn    | Left | Thru | Right |
| 4:00 PM    | 0                         | 0    | 1    | 0     | 0                         | 0    | 2    | 0     | 0                       | 0    | 0    | 0     | 0         | 0    | 0    | 0     |
| 4:15 PM    | 0                         | 0    | 0    | 0     | 0                         | 0    | 1    | 0     | 0                       | 0    | 0    | 0     | 0         | 0    | 0    | 0     |
| 4:30 PM    | 0                         | 0    | 1    | 0     | 0                         | 0    | 3    | 0     | 0                       | 0    | 0    | 0     | 0         | 0    | 0    | 0     |
| 4:45 PM    | 0                         | 0    | 1    | 0     | 0                         | 0    | 0    | 0     | 0                       | 0    | 0    | 0     | 0         | 0    | 0    | 0     |
| 5:00 PM    | 0                         | 0    | 2    | 0     | 0                         | 0    | 1    | 0     | 0                       | 0    | 0    | 0     | 0         | 0    | 0    | 0     |
| 5:15 PM    | 0                         | 0    | 0    | 0     | 0                         | 0    | 0    | 0     | 0                       | 0    | 0    | 0     | 0         | 0    | 0    | 0     |
| 5:30 PM    | 0                         | 0    | 1    | 0     | 0                         | 0    | 1    | 0     | 0                       | 0    | 0    | 0     | 0         | 0    | 0    | 0     |
| 5:45 PM    | 0                         | 0    | 0    | 0     | 0                         | 0    | 0    | 0     | 0                       | 0    | 0    | 0     | 0         | 0    | 0    | 0     |

| AM PEAK HOUR       |  | Needham Street Northbound |      |      |       | Needham Street Southbound |      |      |       | Mill Driveway Eastbound |      |      |       | Westbound |      |      |       |
|--------------------|--|---------------------------|------|------|-------|---------------------------|------|------|-------|-------------------------|------|------|-------|-----------|------|------|-------|
| 7:30 AM to 8:30 AM |  | U-Turn                    | Left | Thru | Right | U-Turn                    | Left | Thru | Right | U-Turn                  | Left | Thru | Right | U-Turn    | Left | Thru | Right |
| PHF                |  | 0                         | 0    | 10   | 0     | 0                         | 0    | 14   | 0     | 0                       | 0    | 0    | 0     | 0         | 0    | 0    | 0     |
|                    |  | 0.83                      |      |      |       | 0.58                      |      |      |       | 0.00                    |      |      |       | 0.00      |      |      |       |

| PM PEAK HOUR       |  | Needham Street Northbound |      |      |       | Needham Street Southbound |      |      |       | Mill Driveway Eastbound |      |      |       | Westbound |      |      |       |
|--------------------|--|---------------------------|------|------|-------|---------------------------|------|------|-------|-------------------------|------|------|-------|-----------|------|------|-------|
| 4:00 PM to 5:00 PM |  | U-Turn                    | Left | Thru | Right | U-Turn                    | Left | Thru | Right | U-Turn                  | Left | Thru | Right | U-Turn    | Left | Thru | Right |
| PHF                |  | 0                         | 0    | 3    | 0     | 0                         | 0    | 6    | 0     | 0                       | 0    | 0    | 0     | 0         | 0    | 0    | 0     |
|                    |  | 0.75                      |      |      |       | 0.50                      |      |      |       | 0.00                    |      |      |       | 0.00      |      |      |       |

Client: Matt Duranleau  
Project #: 12239.00\_127\_018\_VHb  
BTD #: Location 6  
Location: Newton, MA  
Street 1: Needham Street  
Street 2: Mill Driveway  
Count Date: 10/26/2017  
Day of Week: Thursday  
Weather: Rainy, 55°F



#### PEDESTRIANS & BICYCLES

| Start Time | Needham Street Northbound |      |       |     | Needham Street Southbound |      |       |     | Mill Driveway Eastbound |      |       |     | Westbound |      |       |     |
|------------|---------------------------|------|-------|-----|---------------------------|------|-------|-----|-------------------------|------|-------|-----|-----------|------|-------|-----|
|            | Left                      | Thru | Right | PED | Left                      | Thru | Right | PED | Left                    | Thru | Right | PED | Left      | Thru | Right | PED |
| 7:00 AM    | 0                         | 0    | 0     | 0   | 0                         | 0    | 0     | 0   | 0                       | 0    | 0     | 0   | 0         | 0    | 0     | 0   |
| 7:15 AM    | 0                         | 0    | 0     | 0   | 0                         | 0    | 0     | 0   | 0                       | 0    | 0     | 0   | 0         | 0    | 0     | 0   |
| 7:30 AM    | 0                         | 1    | 0     | 0   | 0                         | 0    | 0     | 1   | 0                       | 0    | 0     | 1   | 0         | 0    | 0     | 0   |
| 7:45 AM    | 0                         | 0    | 0     | 0   | 0                         | 0    | 0     | 0   | 0                       | 0    | 0     | 0   | 0         | 0    | 0     | 0   |
| 8:00 AM    | 0                         | 1    | 0     | 0   | 0                         | 0    | 0     | 0   | 0                       | 0    | 0     | 0   | 0         | 0    | 0     | 0   |
| 8:15 AM    | 0                         | 0    | 0     | 0   | 0                         | 0    | 0     | 0   | 0                       | 0    | 0     | 0   | 0         | 0    | 0     | 0   |
| 8:30 AM    | 0                         | 0    | 0     | 0   | 0                         | 0    | 0     | 0   | 0                       | 0    | 0     | 0   | 0         | 0    | 0     | 0   |
| 8:45 AM    | 0                         | 0    | 0     | 0   | 0                         | 0    | 0     | 0   | 0                       | 0    | 0     | 1   | 0         | 0    | 0     | 0   |

| Start Time | Needham Street Northbound |      |       |     | Needham Street Southbound |      |       |     | Mill Driveway Eastbound |      |       |     | Westbound |      |       |     |
|------------|---------------------------|------|-------|-----|---------------------------|------|-------|-----|-------------------------|------|-------|-----|-----------|------|-------|-----|
|            | Left                      | Thru | Right | PED | Left                      | Thru | Right | PED | Left                    | Thru | Right | PED | Left      | Thru | Right | PED |
| 4:00 PM    | 0                         | 0    | 0     | 0   | 0                         | 1    | 0     | 0   | 0                       | 0    | 0     | 2   | 0         | 0    | 0     | 0   |
| 4:15 PM    | 0                         | 0    | 0     | 0   | 0                         | 0    | 0     | 0   | 0                       | 0    | 0     | 1   | 0         | 0    | 0     | 0   |
| 4:30 PM    | 0                         | 1    | 0     | 0   | 0                         | 0    | 0     | 0   | 0                       | 0    | 0     | 4   | 0         | 0    | 0     | 0   |
| 4:45 PM    | 0                         | 0    | 0     | 0   | 0                         | 0    | 0     | 0   | 0                       | 0    | 0     | 2   | 0         | 0    | 0     | 0   |
| 5:00 PM    | 0                         | 1    | 0     | 0   | 0                         | 0    | 0     | 0   | 0                       | 0    | 0     | 1   | 0         | 0    | 0     | 0   |
| 5:15 PM    | 0                         | 0    | 0     | 0   | 0                         | 0    | 0     | 0   | 0                       | 0    | 0     | 0   | 0         | 0    | 0     | 0   |
| 5:30 PM    | 0                         | 0    | 0     | 0   | 0                         | 0    | 0     | 0   | 0                       | 0    | 0     | 1   | 0         | 0    | 0     | 0   |
| 5:45 PM    | 0                         | 0    | 0     | 0   | 0                         | 0    | 0     | 0   | 0                       | 0    | 0     | 1   | 0         | 0    | 0     | 0   |

| AM PEAK HOUR       |  | Needham Street Northbound |      |       |     | Needham Street Southbound |      |       |     | Mill Driveway Eastbound |      |       |     | Westbound |      |       |     |
|--------------------|--|---------------------------|------|-------|-----|---------------------------|------|-------|-----|-------------------------|------|-------|-----|-----------|------|-------|-----|
| 8:00 AM to 9:00 AM |  | Left                      | Thru | Right | PED | Left                      | Thru | Right | PED | Left                    | Thru | Right | PED | Left      | Thru | Right | PED |
|                    |  | 0                         | 1    | 0     | 0   | 0                         | 0    | 0     | 0   | 0                       | 0    | 0     | 2   | 0         | 0    | 0     | 0   |

| PM PEAK HOUR       |  | Needham Street Northbound |      |       |     | Needham Street Southbound |      |       |     | Mill Driveway Eastbound |      |       |     | Westbound |      |       |     |
|--------------------|--|---------------------------|------|-------|-----|---------------------------|------|-------|-----|-------------------------|------|-------|-----|-----------|------|-------|-----|
| 4:15 PM to 5:15 PM |  | Left                      | Thru | Right | PED | Left                      | Thru | Right | PED | Left                    | Thru | Right | PED | Left      | Thru | Right | PED |
|                    |  | 0                         | 2    | 0     | 0   | 0                         | 0    | 0     | 0   | 0                       | 0    | 0     | 8   | 0         | 0    | 0     | 0   |

\*Peak hour corresponds to vehicular peak hours.

Client: Matt Duranleau  
Project #: 12239.00\_127\_018\_VHb  
BTD #: Location 7  
Location: Newton, MA  
Street 1: Needham Street  
Street 2: TJ Driveway/Marshalls Drive South  
Count Date: 10/26/2017  
Day of Week: Thursday  
Weather: Rainy, 55°F



| TOTAL (CARS & TRUCKS)     |        |      |      |       |                           |      |      |       |        |                                    |      |       |        |      |                              |       |
|---------------------------|--------|------|------|-------|---------------------------|------|------|-------|--------|------------------------------------|------|-------|--------|------|------------------------------|-------|
| Needham Street Northbound |        |      |      |       | Needham Street Southbound |      |      |       |        | Marshalls Driveway South Eastbound |      |       |        |      | T.J. Maxx Driveway Westbound |       |
| Start Time                | U-Turn | Left | Thru | Right | U-Turn                    | Left | Thru | Right | U-Turn | Left                               | Thru | Right | U-Turn | Left | Thru                         | Right |
| 7:00 AM                   | 0      | 4    | 138  | 0     | 0                         | 0    | 85   | 0     | 0      | 0                                  | 0    | 0     | 0      | 0    | 0                            | 0     |
| 7:15 AM                   | 0      | 2    | 148  | 0     | 0                         | 0    | 93   | 0     | 0      | 0                                  | 0    | 2     | 0      | 0    | 0                            | 0     |
| 7:30 AM                   | 0      | 3    | 153  | 0     | 0                         | 0    | 114  | 0     | 0      | 1                                  | 0    | 3     | 0      | 0    | 0                            | 0     |
| 7:45 AM                   | 0      | 4    | 164  | 1     | 0                         | 0    | 131  | 0     | 0      | 0                                  | 0    | 5     | 0      | 0    | 0                            | 0     |
| 8:00 AM                   | 0      | 3    | 169  | 1     | 0                         | 1    | 147  | 0     | 0      | 1                                  | 0    | 6     | 0      | 0    | 0                            | 0     |
| 8:15 AM                   | 0      | 4    | 166  | 0     | 0                         | 1    | 158  | 0     | 0      | 1                                  | 0    | 5     | 0      | 0    | 0                            | 0     |
| 8:30 AM                   | 0      | 4    | 162  | 1     | 0                         | 2    | 153  | 0     | 0      | 0                                  | 0    | 4     | 0      | 0    | 0                            | 0     |
| 8:45 AM                   | 0      | 5    | 158  | 0     | 0                         | 1    | 145  | 0     | 0      | 1                                  | 0    | 5     | 0      | 0    | 0                            | 0     |

| Needham Street Northbound |        |      |      |       | Needham Street Southbound |      |      |       |        | Marshalls Driveway South Eastbound |      |       |        |      | T.J. Maxx Driveway Westbound |       |  |  |  |
|---------------------------|--------|------|------|-------|---------------------------|------|------|-------|--------|------------------------------------|------|-------|--------|------|------------------------------|-------|--|--|--|
| Start Time                | U-Turn | Left | Thru | Right | U-Turn                    | Left | Thru | Right | U-Turn | Left                               | Thru | Right | U-Turn | Left | Thru                         | Right |  |  |  |
| 4:00 PM                   | 0      | 11   | 158  | 1     | 0                         | 2    | 165  | 0     | 0      | 1                                  | 0    | 14    | 0      | 0    | 0                            | 0     |  |  |  |
| 4:15 PM                   | 0      | 10   | 164  | 2     | 0                         | 3    | 178  | 0     | 0      | 0                                  | 0    | 17    | 0      | 0    | 0                            | 1     |  |  |  |
| 4:30 PM                   | 0      | 9    | 163  | 3     | 0                         | 3    | 174  | 1     | 0      | 1                                  | 0    | 19    | 0      | 0    | 0                            | 1     |  |  |  |
| 4:45 PM                   | 0      | 8    | 170  | 5     | 0                         | 2    | 164  | 0     | 0      | 2                                  | 0    | 21    | 0      | 1    | 0                            | 0     |  |  |  |
| 5:00 PM                   | 0      | 7    | 171  | 6     | 0                         | 3    | 150  | 0     | 0      | 1                                  | 0    | 23    | 0      | 1    | 0                            | 0     |  |  |  |
| 5:15 PM                   | 0      | 10   | 173  | 7     | 0                         | 1    | 131  | 0     | 0      | 1                                  | 0    | 22    | 0      | 0    | 0                            | 0     |  |  |  |
| 5:30 PM                   | 0      | 8    | 168  | 5     | 0                         | 2    | 129  | 1     | 0      | 1                                  | 0    | 21    | 0      | 1    | 0                            | 1     |  |  |  |
| 5:45 PM                   | 0      | 9    | 163  | 6     | 0                         | 1    | 126  | 0     | 0      | 0                                  | 0    | 23    | 0      | 1    | 0                            | 0     |  |  |  |

| Needham Street Northbound |      |      |       | Needham Street Southbound |      |      |       | Marshalls Driveway South Eastbound |      |      |       | T.J. Maxx Driveway Westbound |      |      |       |
|---------------------------|------|------|-------|---------------------------|------|------|-------|------------------------------------|------|------|-------|------------------------------|------|------|-------|
| U-Turn                    | Left | Thru | Right | U-Turn                    | Left | Thru | Right | U-Turn                             | Left | Thru | Right | U-Turn                       | Left | Thru | Right |
| 0                         | 16   | 655  | 2     | 0                         | 5    | 603  | 0     | 0                                  | 3    | 0    | 20    | 0                            | 0    | 0    | 0     |
| PHF                       |      |      |       | PHF                       |      |      |       | PHF                                |      |      |       | PHF                          |      |      |       |
| 0.97                      |      |      |       | 0.96                      |      |      |       | 0.82                               |      |      |       | 0.00                         |      |      |       |
| HV %                      |      |      |       | HV %                      |      |      |       | HV %                               |      |      |       | HV %                         |      |      |       |
| 0.0%                      | 0.0% | 1.5% | 0.0%  | 0.0%                      | 0.0% | 2.2% | 0.0%  | 0.0%                               | 0.0% | 0.0% | 5.0%  | 0.0%                         | 0.0% | 0.0% | 0.0%  |

| Needham Street Northbound |      |      |       | Needham Street Southbound |      |      |       | Marshalls Driveway South Eastbound |      |      |       | T.J. Maxx Driveway Westbound |      |      |       |
|---------------------------|------|------|-------|---------------------------|------|------|-------|------------------------------------|------|------|-------|------------------------------|------|------|-------|
| U-Turn                    | Left | Thru | Right | U-Turn                    | Left | Thru | Right | U-Turn                             | Left | Thru | Right | U-Turn                       | Left | Thru | Right |
| 0                         | 34   | 668  | 16    | 0                         | 11   | 666  | 1     | 0                                  | 4    | 0    | 80    | 0                            | 2    | 0    | 2     |
| PHF                       |      |      |       | PHF                       |      |      |       | PHF                                |      |      |       | PHF                          |      |      |       |
| 0.98                      |      |      |       | 0.94                      |      |      |       | 0.88                               |      |      |       | 1.00                         |      |      |       |
| HV %                      |      |      |       | HV %                      |      |      |       | HV %                               |      |      |       | HV %                         |      |      |       |
| 0.0%                      | 0.0% | 0.6% | 0.0%  | 0.0%                      | 0.0% | 0.8% | 0.0%  | 0.0%                               | 0.0% | 0.0% | 0.0%  | 0.0%                         | 0.0% | 0.0% | 0.0%  |

11/6/2017, 8:23 AM, 12239.00\_127\_018\_TMC\_Loc 7

Client: Matt Duranleau  
Project #: 12239.00\_127\_018\_VHb  
BTD #: Location 7  
Location: Newton, MA  
Street 1: Needham Street  
Street 2: TJ Driveway/Marshalls Drive South  
Count Date: 10/26/2017  
Day of Week: Thursday  
Weather: Rainy, 55°F



| TRUCKS                    |        |      |      |                           |        |      |      |                                    |        |      |      |                              |        |      |      |       |
|---------------------------|--------|------|------|---------------------------|--------|------|------|------------------------------------|--------|------|------|------------------------------|--------|------|------|-------|
| Needham Street Northbound |        |      |      | Needham Street Southbound |        |      |      | Marshalls Driveway South Eastbound |        |      |      | T.J. Maxx Driveway Westbound |        |      |      |       |
| Start Time                | U-Turn | Left | Thru | Right                     | U-Turn | Left | Thru | Right                              | U-Turn | Left | Thru | Right                        | U-Turn | Left | Thru | Right |
| 7:00 AM                   | 0      | 0    | 1    | 0                         | 0      | 0    | 3    | 0                                  | 0      | 0    | 0    | 0                            | 0      | 0    | 0    | 0     |
| 7:15 AM                   | 0      | 0    | 2    | 0                         | 0      | 0    | 2    | 0                                  | 0      | 0    | 0    | 0                            | 0      | 0    | 0    | 0     |
| 7:30 AM                   | 0      | 0    | 2    | 0                         | 0      | 0    | 3    | 0                                  | 0      | 0    | 0    | 0                            | 0      | 0    | 0    | 0     |
| 7:45 AM                   | 0      | 0    | 3    | 0                         | 0      | 0    | 2    | 0                                  | 0      | 0    | 0    | 0                            | 0      | 0    | 0    | 0     |
| 8:00 AM                   | 0      | 0    | 3    | 0                         | 0      | 0    | 5    | 0                                  | 0      | 0    | 0    | 1                            | 0      | 0    | 0    | 0     |
| 8:15 AM                   | 0      | 0    | 2    | 0                         | 0      | 0    | 3    | 0                                  | 0      | 0    | 0    | 0                            | 0      | 0    | 0    | 0     |
| 8:30 AM                   | 0      | 0    | 3    | 0                         | 0      | 0    | 2    | 0                                  | 0      | 0    | 0    | 0                            | 0      | 0    | 0    | 0     |
| 8:45 AM                   | 0      | 0    | 2    | 0                         | 0      | 0    | 3    | 0                                  | 0      | 0    | 0    | 0                            | 0      | 0    | 0    | 0     |

| Needham Street Northbound |        |      |      |       | Needham Street Southbound |      |      |       |        | Marshalls Driveway South Eastbound |      |       |        |      | T.J. Maxx Driveway Westbound |       |  |  |  |
|---------------------------|--------|------|------|-------|---------------------------|------|------|-------|--------|------------------------------------|------|-------|--------|------|------------------------------|-------|--|--|--|
| Start Time                | U-Turn | Left | Thru | Right | U-Turn                    | Left | Thru | Right | U-Turn | Left                               | Thru | Right | U-Turn | Left | Thru                         | Right |  |  |  |
| 4:00 PM                   | 0      | 0    | 1    | 0     | 0                         | 0    | 2    | 0     | 0      | 0                                  | 0    | 0     | 0      | 0    | 0                            | 0     |  |  |  |
| 4:15 PM                   | 0      | 0    | 0    | 0     | 0                         | 0    | 1    | 0     | 0      | 0                                  | 0    | 0     | 0      | 0    | 0                            | 0     |  |  |  |
| 4:30 PM                   | 0      | 0    | 1    | 0     | 0                         | 0    | 3    | 0     | 0      | 0                                  | 0    | 0     | 0      | 0    | 0                            | 0     |  |  |  |
| 4:45 PM                   | 0      | 0    | 1    | 0     | 0                         | 0    | 1    | 0     | 0      | 0                                  | 0    | 0     | 0      | 0    | 0                            | 0     |  |  |  |
| 5:00 PM                   | 0      | 0    | 2    | 0     | 0                         | 0    | 0    | 0     | 0      | 0                                  | 0    | 0     | 0      | 0    | 0                            | 0     |  |  |  |
| 5:15 PM                   | 0      | 0    | 1    | 0     | 0                         | 0    | 0    | 0     | 0      | 0                                  | 0    | 0     | 0      | 0    | 0                            | 0     |  |  |  |
| 5:30 PM                   | 0      | 0    | 0    | 0     | 0                         | 0    | 1    | 0     | 0      | 0                                  | 0    | 0     | 0      | 0    | 0                            | 0     |  |  |  |
| 5:45 PM                   | 0      | 0    | 0    | 0     | 0                         | 0    | 0    | 0     | 0      | 0                                  | 0    | 0     | 0      | 0    | 0                            | 0     |  |  |  |

| Needham Street Northbound |      |      |       | Needham Street Southbound |      |      |       | Marshalls Driveway South Eastbound |      |      |       | T.J. Maxx Driveway Westbound |      |      |       |
|---------------------------|------|------|-------|---------------------------|------|------|-------|------------------------------------|------|------|-------|------------------------------|------|------|-------|
| U-Turn                    | Left | Thru | Right | U-Turn                    | Left | Thru | Right | U-Turn                             | Left | Thru | Right | U-Turn                       | Left | Thru | Right |
| 0                         | 0    | 10   | 0     | 0                         | 0    | 13   | 0     | 0                                  | 0    | 0    | 1     | 0                            | 0    | 0    | 0     |
| PHF                       |      |      |       | PHF                       |      |      |       | PHF                                |      |      |       | PHF                          |      |      |       |
| 0.83                      |      |      |       | 0.65                      |      |      |       | 0.25                               |      |      |       | 0.00                         |      |      |       |

| Needham Street Northbound |      |      |       | Needham Street Southbound |      |      |       | Marshalls Driveway South Eastbound |      |      |       | T.J. Maxx Driveway Westbound |      |      |       |
|---------------------------|------|------|-------|---------------------------|------|------|-------|------------------------------------|------|------|-------|------------------------------|------|------|-------|
| U-Turn                    | Left | Thru | Right | U-Turn                    | Left | Thru | Right | U-Turn                             | Left | Thru | Right | U-Turn                       | Left | Thru | Right |
| 0                         | 0    | 3    | 0     | 0                         | 0    | 7    | 0     | 0                                  | 0    | 0    | 0     | 0                            | 0    | 0    | 0     |
| PHF                       |      |      |       | PHF                       |      |      |       | PHF                                |      |      |       | PHF                          |      |      |       |
| 0.75                      |      |      |       | 0.58                      |      |      |       | 0.00                               |      |      |       | 0.00                         |      |      |       |

11/6/2017, 8:23 AM, 12239.00\_127\_018\_TMC\_Loc 7

Client: Matt Duranleau  
Project #: 12239.00\_127\_018\_VHb  
BTD #: Location 7  
Location: Newton, MA  
Street 1: Needham Street  
Street 2: TJ Driveway/Marshalls Drive South  
Count Date: 10/26/2017  
Day of Week: Thursday  
Weather: Rainy, 55°F



PEDESTRIANS & BICYCLES

| Needham Street Northbound |      |      |       |     | Needham Street Southbound |      |       |     |      | Marshalls Driveway South Eastbound |       |     |      |      | T.J. Maxx Driveway Westbound |     |      |      |       |
|---------------------------|------|------|-------|-----|---------------------------|------|-------|-----|------|------------------------------------|-------|-----|------|------|------------------------------|-----|------|------|-------|
| Start Time                | Left | Thru | Right | PED | Left                      | Thru | Right | PED | Left | Thru                               | Right | PED | Left | Thru | Right                        | PED | Left | Thru | Right |
| 7:00 AM                   | 0    | 0    | 0     | 0   | 0                         | 0    | 0     | 0   | 0    | 0                                  | 0     | 0   | 0    | 0    | 0                            | 0   | 0    | 0    | 3     |
| 7:15 AM                   | 0    | 0    | 0     | 0   | 0                         | 0    | 0     | 0   | 0    | 0                                  | 0     | 0   | 0    | 0    | 0                            | 0   | 0    | 0    | 0     |
| 7:30 AM                   | 0    | 1    | 0     | 0   | 0                         | 0    | 0     | 0   | 0    | 0                                  | 0     | 0   | 0    | 0    | 0                            | 0   | 0    | 0    | 2     |
| 7:45 AM                   | 0    | 0    | 0     | 0   | 0                         | 0    | 0     | 0   | 0    | 0                                  | 0     | 0   | 0    | 0    | 0                            | 0   | 0    | 0    | 1     |
| 8:00 AM                   | 0    | 1    | 0     | 0   | 0                         | 0    | 0     | 0   | 0    | 0                                  | 0     | 0   | 0    | 0    | 0                            | 0   | 0    | 0    | 5     |
| 8:15 AM                   | 0    | 0    | 0     | 0   | 0                         | 0    | 0     | 0   | 0    | 0                                  | 0     | 0   | 0    | 0    | 0                            | 0   | 0    | 0    | 2     |
| 8:30 AM                   | 0    | 0    | 0     | 0   | 0                         | 0    | 0     | 0   | 0    | 0                                  | 0     | 0   | 0    | 0    | 0                            | 0   | 0    | 0    | 0     |
| 8:45 AM                   | 0    | 0    | 0     | 0   | 0                         | 0    | 0     | 0   | 0    | 0                                  | 0     | 0   | 0    | 0    | 0                            | 0   | 0    | 0    | 1     |

| Needham Street Northbound |      |      |       |     | Needham Street Southbound |      |       |     |      | Marshalls Driveway South Eastbound |       |     |      |      | T.J. Maxx Driveway Westbound |     |      |      |       |
|---------------------------|------|------|-------|-----|---------------------------|------|-------|-----|------|------------------------------------|-------|-----|------|------|------------------------------|-----|------|------|-------|
| Start Time                | Left | Thru | Right | PED | Left                      | Thru | Right | PED | Left | Thru                               | Right | PED | Left | Thru | Right                        | PED | Left | Thru | Right |
| 4:00 PM                   | 0    | 0    | 0     | 0   | 0                         | 1    | 0     | 0   | 0    | 0                                  | 0     | 1   | 0    | 0    | 0                            | 0   | 0    | 0    | 0     |
| 4:15 PM                   | 0    | 0    | 0     | 0   | 0                         | 0    | 0     | 0   | 0    | 0                                  | 0     | 2   | 0    | 0    | 0                            | 0   | 0    | 0    | 1     |
| 4:30 PM                   | 0    | 1    | 0     | 0   | 0                         | 0    | 0     | 0   | 0    | 0                                  | 0     | 3   | 0    | 0    | 0                            | 0   | 0    | 0    | 1     |
| 4:45 PM                   | 0    | 0    | 0     | 0   | 0                         | 0    | 0     | 0   | 0    | 0                                  | 0     | 2   | 0    | 0    | 0                            | 0   | 0    | 0    | 0     |
| 5:00 PM                   | 0    | 1    | 0     | 0   | 0                         | 0    | 0     | 0   | 0    | 0                                  | 0     | 1   | 0    | 0    | 0                            | 0   | 0    | 0    | 1     |
| 5:15 PM                   | 0    | 0    | 0     | 0   | 0                         | 0    | 0     | 0   | 0    | 0                                  | 0     | 1   | 0    | 0    | 0                            | 0   | 0    | 0    | 2     |
| 5:30 PM                   | 0    | 0    | 0     | 0   | 0                         | 0    | 0     | 0   | 0    | 0                                  | 0     | 0   | 0    | 0    | 0                            | 0   | 0    | 0    | 0     |
| 5:45 PM                   | 0    | 0    | 0     | 0   | 0                         | 0    | 0     | 0   | 0    | 0                                  | 0     | 1   | 0    | 0    | 0                            | 0   | 0    | 0    | 0     |

| Needham Street Northbound |      |      |       |     | Needham Street Southbound |      |       |     |      | Marshalls Driveway South Eastbound |       |     |      |      | T.J. Maxx Driveway Westbound |     |      |      |       |
|---------------------------|------|------|-------|-----|---------------------------|------|-------|-----|------|------------------------------------|-------|-----|------|------|------------------------------|-----|------|------|-------|
| AM PEAK HOUR              | Left | Thru | Right | PED | Left                      | Thru | Right | PED | Left | Thru                               | Right | PED | Left | Thru | Right                        | PED | Left | Thru | Right |
| 8:00 AM to 9:00 AM        | 0    | 1    | 0     | 0   | 0                         | 0    | 0     | 0   | 0    | 0                                  | 0     | 2   | 0    | 0    | 0                            | 0   | 0    | 0    | 8     |

| Needham Street Northbound |      |      |       |     | Needham Street Southbound |      |       |     |      | Marshalls Driveway South Eastbound |       |     |      |      | T.J. Maxx Driveway Westbound |     |      |      |       |
|---------------------------|------|------|-------|-----|---------------------------|------|-------|-----|------|------------------------------------|-------|-----|------|------|------------------------------|-----|------|------|-------|
| PM PEAK HOUR              | Left | Thru | Right | PED | Left                      | Thru | Right | PED | Left | Thru                               | Right | PED | Left | Thru | Right                        | PED | Left | Thru | Right |
| 4:15 PM to 5:15 PM        | 0    | 2    | 0     | 0   | 0                         | 0    | 0     | 0   | 0    | 0                                  | 0     | 8   | 0    | 0    | 0                            | 0   | 0    | 0    | 3     |

\*Peak hours corresponds to vehicular peak hours.

11/6/2017, 8:23 AM, 12239.00\_127\_018\_TMC\_Loc 7

Client: Matt Duranleau  
Project #: 12239.00\_127\_018\_VHb  
BTD #: Location 8  
Location: Newton, MA  
Street 1: Needham Street  
Street 2: Charlemont St/Marshalls Drive North  
Count Date: 10/26/2017  
Day of Week: Thursday  
Weather: Rainy, 55°F



TOTAL (CARS & TRUCKS)

| Needham Street Northbound |        |      |      |       | Needham Street Southbound |      |      |       |        | Marshalls Driveway North Eastbound |      |       |        |      | Charlemont Street Westbound |       |        |      |      |
|---------------------------|--------|------|------|-------|---------------------------|------|------|-------|--------|------------------------------------|------|-------|--------|------|-----------------------------|-------|--------|------|------|
| Start Time                | U-Turn | Left | Thru | Right | U-Turn                    | Left | Thru | Right | U-Turn | Left                               | Thru | Right | U-Turn | Left | Thru                        | Right | U-Turn | Left | Thru |
| 7:00 AM                   | 0      | 0    | 134  | 4     | 0                         | 1    | 80   | 0     | 0      | 2                                  | 0    | 1     | 0      | 4    | 0                           | 2     |        |      |      |
| 7:15 AM                   | 0      | 1    | 142  | 5     | 0                         | 1    | 85   | 1     | 0      | 2                                  | 0    | 1     | 0      | 7    | 0                           | 3     |        |      |      |
| 7:30 AM                   | 0      | 2    | 147  | 5     | 0                         | 2    | 109  | 2     | 0      | 1                                  | 0    | 0     | 0      | 5    | 0                           | 4     |        |      |      |
| 7:45 AM                   | 0      | 4    | 154  | 6     | 0                         | 2    | 125  | 1     | 0      | 1                                  | 0    | 0     | 0      | 6    | 0                           | 4     |        |      |      |
| 8:00 AM                   | 0      | 3    | 160  | 7     | 0                         | 3    | 141  | 3     | 0      | 0                                  | 0    | 0     | 0      | 7    | 0                           | 5     |        |      |      |
| 8:15 AM                   | 0      | 5    | 155  | 7     | 0                         | 1    | 153  | 4     | 0      | 1                                  | 0    | 1     | 0      | 5    | 0                           | 3     |        |      |      |
| 8:30 AM                   | 0      | 4    | 152  | 6     | 0                         | 2    | 147  | 5     | 0      | 1                                  | 0    | 2     | 0      | 6    | 0                           | 4     |        |      |      |
| 8:45 AM                   | 0      | 3    | 151  | 5     | 0                         | 1    | 141  | 3     | 0      | 2                                  | 0    | 1     | 0      | 4    | 0                           | 2     |        |      |      |

| Needham Street Northbound |        |      |      |       | Needham Street Southbound |      |      |       |        | Marshalls Driveway North Eastbound |      |       |        |      | Charlemont Street Westbound |       |        |      |      |
|---------------------------|--------|------|------|-------|---------------------------|------|------|-------|--------|------------------------------------|------|-------|--------|------|-----------------------------|-------|--------|------|------|
| Start Time                | U-Turn | Left | Thru | Right | U-Turn                    | Left | Thru | Right | U-Turn | Left                               | Thru | Right | U-Turn | Left | Thru                        | Right | U-Turn | Left | Thru |
| 4:00 PM                   | 0      | 10   | 147  | 2     | 0                         | 1    | 155  | 22    | 0      | 17                                 | 0    | 8     | 0      | 4    | 2                           | 3     |        |      |      |
| 4:15 PM                   | 0      | 9    | 153  | 3     | 0                         | 1    | 166  | 23    | 0      | 19                                 | 0    | 9     | 0      | 6    | 2                           | 4     |        |      |      |
| 4:30 PM                   | 0      | 7    | 154  | 4     | 0                         | 2    | 166  | 20    | 0      | 18                                 | 0    | 7     | 0      | 5    | 4                           | 2     |        |      |      |
| 4:45 PM                   | 0      | 6    | 161  | 5     | 0                         | 1    | 154  | 17    | 0      | 19                                 | 0    | 8     | 0      | 4    | 3                           | 3     |        |      |      |
| 5:00 PM                   | 0      | 5    | 160  | 7     | 0                         | 2    | 140  | 15    | 0      | 20                                 | 0    | 6     | 0      | 5    | 2                           | 5     |        |      |      |
| 5:15 PM                   | 0      | 7    | 161  | 6     | 0                         | 1    | 124  | 12    | 0      | 21                                 | 0    | 7     | 0      | 3    | 4                           | 4     |        |      |      |
| 5:30 PM                   | 0      | 6    | 159  | 5     | 0                         | 1    | 122  | 13    | 0      | 19                                 | 0    | 6     | 0      | 4    | 3                           | 2     |        |      |      |
| 5:45 PM                   | 0      | 7    | 151  | 5     | 0                         | 0    | 119  | 11    | 0      | 21                                 | 0    | 5     | 0      | 3    | 2                           | 3     |        |      |      |

| Needham Street Northbound |        |      |      |       | Needham Street Southbound |      |      |       |        | Marshalls Driveway North Eastbound |      |       |        |      | Charlemont Street Westbound |       |        |      |      |
|---------------------------|--------|------|------|-------|---------------------------|------|------|-------|--------|------------------------------------|------|-------|--------|------|-----------------------------|-------|--------|------|------|
| AM PEAK HOUR              | U-Turn | Left | Thru | Right | U-Turn                    | Left | Thru | Right | U-Turn | Left                               | Thru | Right | U-Turn | Left | Thru                        | Right | U-Turn | Left | Thru |
| 8:00 AM to 9:00 AM        | 0      | 15   | 618  | 25    | 0                         | 7    | 582  | 15    | 0      | 4                                  | 0    | 4     | 0      | 22   | 0                           | 14    |        |      |      |
| PHF                       | 0.97   |      |      |       | 0.96                      |      |      |       | 0.67   |                                    |      |       | 0.75   |      |                             |       |        |      |      |
| HV %                      | 0.0%   | 0.0% | 1.6% | 0.0%  | 0.0%                      | 0.0% | 2.1% | 0.0%  | 0.0%   | 0.0%                               | 0.0% | 0.0%  | 0.0%   | 0.0% | 0.0%                        | 0.0%  | 0.0%   | 0.0% | 0.0% |

| Needham Street Northbound |        |      |      |       | Needham Street Southbound |      |      |       |        | Marshalls Driveway North Eastbound |      |       |        |      | Charlemont Street Westbound |       |        |      |      |
|---------------------------|--------|------|------|-------|---------------------------|------|------|-------|--------|------------------------------------|------|-------|--------|------|-----------------------------|-------|--------|------|------|
| PM PEAK HOUR              | U-Turn | Left | Thru | Right | U-Turn                    | Left | Thru | Right | U-Turn | Left                               | Thru | Right | U-Turn | Left | Thru                        | Right | U-Turn | Left | Thru |
| 4:00 PM to 5:00 PM        | 0      | 32   | 615  | 14    | 0                         | 5    | 641  | 82    | 0      | 73                                 | 0    | 32    | 0      | 19   | 11                          | 12    |        |      |      |
| PHF                       | 0.96   |      |      |       | 0.96                      |      |      |       | 0.94   |                                    |      |       | 0.88   |      |                             |       |        |      |      |
| HV %                      | 0.0%   | 0.0% | 0.5% | 0.0%  | 0.0%                      | 0.0% | 1.1% | 0.0%  | 0.0%   | 0.0%                               | 0.0% | 0.0%  | 0.0%   | 0.0% | 0.0%                        | 0.0%  | 0.0%   | 0.0% | 0.0% |

11/6/2017, 8:25 AM, 12239.00\_127\_018\_TMC\_Loc 8

Client: Matt Duranleau  
Project #: 12239.00\_127\_018\_VHb  
BTD #: Location 8  
Location: Newton, MA  
Street 1: Needham Street  
Street 2: Charlemont St/Marshalls Drive North  
Count Date: 10/26/2017  
Day of Week: Thursday  
Weather: Rainy, 55°F



#### TRUCKS

| Start Time | Needham Street Northbound |      |      |       | Needham Street Southbound |      |      |       | Marshalls Driveway North Eastbound |      |      |       | Charlemont Street Westbound |      |      |       |
|------------|---------------------------|------|------|-------|---------------------------|------|------|-------|------------------------------------|------|------|-------|-----------------------------|------|------|-------|
|            | U-Turn                    | Left | Thru | Right | U-Turn                    | Left | Thru | Right | U-Turn                             | Left | Thru | Right | U-Turn                      | Left | Thru | Right |
| 7:00 AM    | 0                         | 0    | 1    | 0     | 0                         | 0    | 3    | 0     | 0                                  | 0    | 0    | 0     | 0                           | 0    | 0    | 0     |
| 7:15 AM    | 0                         | 0    | 2    | 0     | 0                         | 0    | 2    | 0     | 0                                  | 0    | 0    | 0     | 0                           | 1    | 0    | 0     |
| 7:30 AM    | 0                         | 0    | 3    | 0     | 0                         | 0    | 3    | 0     | 0                                  | 0    | 0    | 0     | 0                           | 0    | 0    | 0     |
| 7:45 AM    | 0                         | 0    | 2    | 0     | 0                         | 0    | 3    | 0     | 0                                  | 0    | 0    | 0     | 0                           | 0    | 0    | 0     |
| 8:00 AM    | 0                         | 0    | 3    | 0     | 0                         | 0    | 4    | 0     | 0                                  | 0    | 0    | 0     | 0                           | 0    | 0    | 0     |
| 8:15 AM    | 0                         | 0    | 2    | 0     | 0                         | 0    | 3    | 0     | 0                                  | 0    | 0    | 0     | 0                           | 0    | 0    | 0     |
| 8:30 AM    | 0                         | 0    | 3    | 0     | 0                         | 0    | 3    | 0     | 0                                  | 0    | 0    | 0     | 0                           | 0    | 0    | 0     |
| 8:45 AM    | 0                         | 0    | 2    | 0     | 0                         | 0    | 2    | 0     | 0                                  | 0    | 0    | 0     | 0                           | 0    | 0    | 0     |

| Start Time | Needham Street Northbound |      |      |       | Needham Street Southbound |      |      |       | Marshalls Driveway North Eastbound |      |      |       | Charlemont Street Westbound |      |      |       |
|------------|---------------------------|------|------|-------|---------------------------|------|------|-------|------------------------------------|------|------|-------|-----------------------------|------|------|-------|
|            | U-Turn                    | Left | Thru | Right | U-Turn                    | Left | Thru | Right | U-Turn                             | Left | Thru | Right | U-Turn                      | Left | Thru | Right |
| 4:00 PM    | 0                         | 0    | 1    | 0     | 0                         | 0    | 2    | 0     | 0                                  | 0    | 0    | 0     | 0                           | 0    | 0    | 0     |
| 4:15 PM    | 0                         | 0    | 0    | 0     | 0                         | 0    | 1    | 0     | 0                                  | 0    | 0    | 0     | 0                           | 0    | 0    | 0     |
| 4:30 PM    | 0                         | 0    | 1    | 0     | 0                         | 0    | 2    | 0     | 0                                  | 0    | 0    | 0     | 0                           | 0    | 0    | 0     |
| 4:45 PM    | 0                         | 0    | 1    | 0     | 0                         | 0    | 2    | 0     | 0                                  | 0    | 0    | 0     | 0                           | 0    | 0    | 0     |
| 5:00 PM    | 0                         | 0    | 2    | 0     | 0                         | 0    | 0    | 0     | 0                                  | 0    | 0    | 0     | 0                           | 0    | 0    | 0     |
| 5:15 PM    | 0                         | 0    | 0    | 0     | 0                         | 0    | 0    | 0     | 0                                  | 0    | 0    | 0     | 0                           | 0    | 0    | 0     |
| 5:30 PM    | 0                         | 0    | 1    | 0     | 0                         | 0    | 1    | 0     | 0                                  | 0    | 0    | 0     | 0                           | 0    | 0    | 0     |
| 5:45 PM    | 0                         | 0    | 0    | 0     | 0                         | 0    | 0    | 0     | 0                                  | 0    | 0    | 0     | 0                           | 0    | 0    | 0     |

| AM PEAK HOUR       |  | Needham Street Northbound |      |      |       | Needham Street Southbound |      |      |       | Marshalls Driveway North Eastbound |      |      |       | Charlemont Street Westbound |      |      |       |
|--------------------|--|---------------------------|------|------|-------|---------------------------|------|------|-------|------------------------------------|------|------|-------|-----------------------------|------|------|-------|
| 7:15 AM to 8:15 AM |  | U-Turn                    | Left | Thru | Right | U-Turn                    | Left | Thru | Right | U-Turn                             | Left | Thru | Right | U-Turn                      | Left | Thru | Right |
| PHF                |  | 0                         | 0    | 10   | 0     | 0                         | 0    | 12   | 0     | 0                                  | 0    | 0    | 0     | 0                           | 1    | 0    | 0     |
|                    |  | 0.83                      |      |      |       | 0.75                      |      |      |       | 0.00                               |      |      |       | 0.25                        |      |      |       |

| PM PEAK HOUR       |  | Needham Street Northbound |      |      |       | Needham Street Southbound |      |      |       | Marshalls Driveway North Eastbound |      |      |       | Charlemont Street Westbound |      |      |       |
|--------------------|--|---------------------------|------|------|-------|---------------------------|------|------|-------|------------------------------------|------|------|-------|-----------------------------|------|------|-------|
| 4:00 PM to 5:00 PM |  | U-Turn                    | Left | Thru | Right | U-Turn                    | Left | Thru | Right | U-Turn                             | Left | Thru | Right | U-Turn                      | Left | Thru | Right |
| PHF                |  | 0                         | 0    | 3    | 0     | 0                         | 0    | 7    | 0     | 0                                  | 0    | 0    | 0     | 0                           | 0    | 0    | 0     |
|                    |  | 0.75                      |      |      |       | 0.88                      |      |      |       | 0.00                               |      |      |       | 0.00                        |      |      |       |

Client: Matt Duranleau  
Project #: 12239.00\_127\_018\_VHb  
BTD #: Location 8  
Location: Newton, MA  
Street 1: Needham Street  
Street 2: Charlemont St/Marshalls Drive North  
Count Date: 10/26/2017  
Day of Week: Thursday  
Weather: Rainy, 55°F



#### PEDESTRIANS & BICYCLES

| Start Time | Needham Street Northbound |      |       |     | Needham Street Southbound |      |       |     | Marshalls Driveway North Eastbound |      |       |     | Charlemont Street Westbound |      |       |     |
|------------|---------------------------|------|-------|-----|---------------------------|------|-------|-----|------------------------------------|------|-------|-----|-----------------------------|------|-------|-----|
|            | Left                      | Thru | Right | PED | Left                      | Thru | Right | PED | Left                               | Thru | Right | PED | Left                        | Thru | Right | PED |
| 7:00 AM    | 0                         | 0    | 0     | 0   | 0                         | 0    | 0     | 0   | 0                                  | 0    | 0     | 0   | 0                           | 0    | 0     | 2   |
| 7:15 AM    | 0                         | 1    | 0     | 0   | 0                         | 0    | 0     | 0   | 0                                  | 0    | 0     | 0   | 0                           | 0    | 0     | 1   |
| 7:30 AM    | 0                         | 0    | 0     | 0   | 0                         | 0    | 0     | 0   | 0                                  | 0    | 0     | 0   | 0                           | 0    | 0     | 2   |
| 7:45 AM    | 0                         | 0    | 0     | 0   | 0                         | 0    | 0     | 0   | 0                                  | 0    | 1     | 0   | 0                           | 0    | 0     | 1   |
| 8:00 AM    | 0                         | 1    | 0     | 0   | 0                         | 0    | 0     | 1   | 0                                  | 0    | 0     | 0   | 1                           | 0    | 0     | 4   |
| 8:15 AM    | 0                         | 0    | 0     | 0   | 0                         | 0    | 0     | 0   | 0                                  | 0    | 0     | 0   | 0                           | 0    | 0     | 1   |
| 8:30 AM    | 0                         | 0    | 0     | 0   | 0                         | 0    | 0     | 0   | 0                                  | 0    | 0     | 1   | 0                           | 0    | 0     | 1   |
| 8:45 AM    | 0                         | 0    | 0     | 0   | 0                         | 0    | 0     | 0   | 0                                  | 0    | 0     | 0   | 0                           | 0    | 0     | 0   |

| Start Time | Needham Street Northbound |      |       |     | Needham Street Southbound |      |       |     | Marshalls Driveway North Eastbound |      |       |     | Charlemont Street Westbound |      |       |     |
|------------|---------------------------|------|-------|-----|---------------------------|------|-------|-----|------------------------------------|------|-------|-----|-----------------------------|------|-------|-----|
|            | Left                      | Thru | Right | PED | Left                      | Thru | Right | PED | Left                               | Thru | Right | PED | Left                        | Thru | Right | PED |
| 4:00 PM    | 0                         | 0    | 0     | 0   | 0                         | 0    | 0     | 0   | 0                                  | 0    | 0     | 1   | 0                           | 0    | 0     | 1   |
| 4:15 PM    | 0                         | 0    | 0     | 0   | 0                         | 1    | 0     | 0   | 0                                  | 0    | 0     | 2   | 0                           | 0    | 0     | 0   |
| 4:30 PM    | 0                         | 1    | 0     | 0   | 0                         | 0    | 0     | 0   | 0                                  | 0    | 0     | 2   | 0                           | 0    | 0     | 1   |
| 4:45 PM    | 0                         | 0    | 0     | 0   | 0                         | 0    | 0     | 0   | 0                                  | 0    | 0     | 3   | 0                           | 0    | 0     | 0   |
| 5:00 PM    | 0                         | 0    | 0     | 0   | 0                         | 0    | 0     | 0   | 0                                  | 0    | 0     | 0   | 0                           | 0    | 0     | 2   |
| 5:15 PM    | 0                         | 1    | 0     | 0   | 0                         | 0    | 0     | 0   | 0                                  | 0    | 0     | 2   | 0                           | 0    | 0     | 0   |
| 5:30 PM    | 0                         | 0    | 0     | 0   | 0                         | 0    | 0     | 0   | 0                                  | 0    | 1     | 1   | 0                           | 0    | 0     | 1   |
| 5:45 PM    | 0                         | 0    | 0     | 0   | 0                         | 0    | 0     | 0   | 0                                  | 0    | 0     | 0   | 0                           | 0    | 0     | 0   |

| AM PEAK HOUR       |  | Needham Street Northbound |      |       |     | Needham Street Southbound |      |       |     | Marshalls Driveway North Eastbound |      |       |     | Charlemont Street Westbound |      |       |     |
|--------------------|--|---------------------------|------|-------|-----|---------------------------|------|-------|-----|------------------------------------|------|-------|-----|-----------------------------|------|-------|-----|
| 8:00 AM to 9:00 AM |  | Left                      | Thru | Right | PED | Left                      | Thru | Right | PED | Left                               | Thru | Right | PED | Left                        | Thru | Right | PED |
|                    |  | 0                         | 1    | 0     | 0   | 0                         | 0    | 0     | 1   | 0                                  | 0    | 0     | 2   | 1                           | 0    | 0     | 6   |

| PM PEAK HOUR       |  | Needham Street Northbound |      |       |     | Needham Street Southbound |      |       |     | Marshalls Driveway North Eastbound |      |       |     | Charlemont Street Westbound |      |       |     |
|--------------------|--|---------------------------|------|-------|-----|---------------------------|------|-------|-----|------------------------------------|------|-------|-----|-----------------------------|------|-------|-----|
| 4:00 PM to 5:00 PM |  | Left                      | Thru | Right | PED | Left                      | Thru | Right | PED | Left                               | Thru | Right | PED | Left                        | Thru | Right | PED |
|                    |  | 0                         | 1    | 0     | 0   | 0                         | 1    | 0     | 0   | 0                                  | 0    | 0     | 8   | 0                           | 0    | 0     | 2   |

\*Peak hour corresponds to vehicular peak hours.



Client: Matt Duranleau  
Project #: 12239.00\_127\_018\_VHb  
BTD #: Location 11  
Location: Newton, MA  
Street 1: Needham Street  
Street 2: Jaconnet Street  
Count Date: 10/26/2017  
Day of Week: Thursday  
Weather: Rainy, 55°F



**TOTAL (CARS & TRUCKS)**

| Needham Street Northbound |        |      |      |       | Needham Street Southbound |      |      |       |        | Eastbound |      |       |        |      | Jaconnet Street Westbound |       |  |  |  |
|---------------------------|--------|------|------|-------|---------------------------|------|------|-------|--------|-----------|------|-------|--------|------|---------------------------|-------|--|--|--|
| Start Time                | U-Turn | Left | Thru | Right | U-Turn                    | Left | Thru | Right | U-Turn | Left      | Thru | Right | U-Turn | Left | Thru                      | Right |  |  |  |
| 7:00 AM                   | 0      | 0    | 139  | 1     | 0                         | 0    | 137  | 0     | 0      | 0         | 0    | 0     | 0      | 0    | 0                         | 4     |  |  |  |
| 7:15 AM                   | 0      | 0    | 147  | 2     | 0                         | 0    | 143  | 0     | 0      | 0         | 0    | 0     | 0      | 1    | 0                         | 2     |  |  |  |
| 7:30 AM                   | 0      | 0    | 146  | 3     | 0                         | 0    | 155  | 0     | 0      | 0         | 0    | 0     | 0      | 2    | 0                         | 3     |  |  |  |
| 7:45 AM                   | 0      | 0    | 152  | 5     | 0                         | 1    | 162  | 0     | 0      | 0         | 0    | 0     | 0      | 2    | 0                         | 4     |  |  |  |
| 8:00 AM                   | 0      | 0    | 155  | 6     | 0                         | 0    | 171  | 0     | 0      | 0         | 0    | 0     | 0      | 1    | 0                         | 2     |  |  |  |
| 8:15 AM                   | 0      | 0    | 153  | 5     | 0                         | 0    | 173  | 0     | 0      | 0         | 0    | 0     | 0      | 2    | 0                         | 3     |  |  |  |
| 8:30 AM                   | 0      | 0    | 152  | 4     | 0                         | 1    | 176  | 0     | 0      | 0         | 0    | 0     | 0      | 1    | 0                         | 2     |  |  |  |
| 8:45 AM                   | 0      | 0    | 146  | 3     | 0                         | 1    | 169  | 0     | 0      | 0         | 0    | 0     | 0      | 1    | 0                         | 2     |  |  |  |

| Needham Street Northbound |        |      |      |       | Needham Street Southbound |      |      |       |        | Eastbound |      |       |        |      | Jaconnet Street Westbound |       |  |  |  |
|---------------------------|--------|------|------|-------|---------------------------|------|------|-------|--------|-----------|------|-------|--------|------|---------------------------|-------|--|--|--|
| Start Time                | U-Turn | Left | Thru | Right | U-Turn                    | Left | Thru | Right | U-Turn | Left      | Thru | Right | U-Turn | Left | Thru                      | Right |  |  |  |
| 4:00 PM                   | 0      | 0    | 158  | 9     | 0                         | 3    | 158  | 0     | 0      | 0         | 0    | 0     | 0      | 6    | 0                         | 5     |  |  |  |
| 4:15 PM                   | 0      | 0    | 164  | 7     | 0                         | 2    | 159  | 0     | 0      | 0         | 0    | 0     | 0      | 12   | 0                         | 7     |  |  |  |
| 4:30 PM                   | 0      | 0    | 166  | 4     | 0                         | 3    | 153  | 0     | 0      | 0         | 0    | 0     | 0      | 17   | 0                         | 9     |  |  |  |
| 4:45 PM                   | 0      | 0    | 165  | 7     | 0                         | 3    | 149  | 0     | 0      | 0         | 0    | 0     | 0      | 15   | 0                         | 8     |  |  |  |
| 5:00 PM                   | 0      | 0    | 175  | 9     | 0                         | 2    | 142  | 0     | 0      | 0         | 0    | 0     | 0      | 13   | 0                         | 6     |  |  |  |
| 5:15 PM                   | 0      | 0    | 172  | 8     | 0                         | 4    | 128  | 0     | 0      | 0         | 0    | 0     | 0      | 12   | 0                         | 7     |  |  |  |
| 5:30 PM                   | 0      | 0    | 170  | 7     | 0                         | 1    | 127  | 0     | 0      | 0         | 0    | 0     | 0      | 11   | 0                         | 5     |  |  |  |
| 5:45 PM                   | 0      | 0    | 165  | 5     | 0                         | 2    | 124  | 0     | 0      | 0         | 0    | 0     | 0      | 8    | 0                         | 4     |  |  |  |

| Needham Street Northbound |      |      |       | Needham Street Southbound |      |      |       | Eastbound |      |      |       | Jaconnet Street Westbound |      |      |       |
|---------------------------|------|------|-------|---------------------------|------|------|-------|-----------|------|------|-------|---------------------------|------|------|-------|
| U-Turn                    | Left | Thru | Right | U-Turn                    | Left | Thru | Right | U-Turn    | Left | Thru | Right | U-Turn                    | Left | Thru | Right |
| 0                         | 0    | 612  | 20    | 0                         | 2    | 682  | 0     | 0         | 0    | 0    | 0     | 6                         | 0    | 0    | 11    |
| PHF                       |      |      |       | PHF                       |      |      |       | PHF       |      |      |       | PHF                       |      |      |       |
| 0.98                      |      |      |       | 0.97                      |      |      |       | 0.00      |      |      |       | 0.71                      |      |      |       |
| HV %                      |      |      |       | HV %                      |      |      |       | HV %      |      |      |       | HV %                      |      |      |       |
| 0.0%                      | 0.0% | 1.6% | 0.0%  | 0.0%                      | 0.0% | 1.6% | 0.0%  | 0.0%      | 0.0% | 0.0% | 0.0%  | 0.0%                      | 0.0% | 0.0% | 0.0%  |

| Needham Street Northbound |      |      |       | Needham Street Southbound |      |      |       | Eastbound |      |      |       | Jaconnet Street Westbound |      |      |       |
|---------------------------|------|------|-------|---------------------------|------|------|-------|-----------|------|------|-------|---------------------------|------|------|-------|
| U-Turn                    | Left | Thru | Right | U-Turn                    | Left | Thru | Right | U-Turn    | Left | Thru | Right | U-Turn                    | Left | Thru | Right |
| 0                         | 0    | 670  | 27    | 0                         | 10   | 663  | 0     | 0         | 0    | 0    | 0     | 0                         | 57   | 0    | 30    |
| PHF                       |      |      |       | PHF                       |      |      |       | PHF       |      |      |       | PHF                       |      |      |       |
| 0.95                      |      |      |       | 0.95                      |      |      |       | 0.00      |      |      |       | 0.84                      |      |      |       |
| HV %                      |      |      |       | HV %                      |      |      |       | HV %      |      |      |       | HV %                      |      |      |       |
| 0.0%                      | 0.0% | 0.6% | 0.0%  | 0.0%                      | 0.0% | 0.8% | 0.0%  | 0.0%      | 0.0% | 0.0% | 0.0%  | 0.0%                      | 0.0% | 0.0% | 0.0%  |

11/6/2017, 8:36 AM, 12239.00\_127\_018\_TMC\_Loc 11

Client: Matt Duranleau  
Project #: 12239.00\_127\_018\_VHb  
BTD #: Location 11  
Location: Newton, MA  
Street 1: Needham Street  
Street 2: Jaconnet Street  
Count Date: 10/26/2017  
Day of Week: Thursday  
Weather: Rainy, 55°F



**TRUCKS**

| Needham Street Northbound |        |      |      |       | Needham Street Southbound |      |      |       |        | Eastbound |      |       |        |      | Jaconnet Street Westbound |       |  |  |  |
|---------------------------|--------|------|------|-------|---------------------------|------|------|-------|--------|-----------|------|-------|--------|------|---------------------------|-------|--|--|--|
| Start Time                | U-Turn | Left | Thru | Right | U-Turn                    | Left | Thru | Right | U-Turn | Left      | Thru | Right | U-Turn | Left | Thru                      | Right |  |  |  |
| 7:00 AM                   | 0      | 0    | 1    | 0     | 0                         | 0    | 3    | 0     | 0      | 0         | 0    | 0     | 0      | 0    | 0                         | 0     |  |  |  |
| 7:15 AM                   | 0      | 0    | 2    | 0     | 0                         | 0    | 2    | 0     | 0      | 0         | 0    | 0     | 0      | 0    | 0                         | 0     |  |  |  |
| 7:30 AM                   | 0      | 0    | 3    | 0     | 0                         | 0    | 4    | 0     | 0      | 0         | 0    | 0     | 0      | 0    | 0                         | 0     |  |  |  |
| 7:45 AM                   | 0      | 0    | 2    | 0     | 0                         | 0    | 2    | 0     | 0      | 0         | 0    | 0     | 0      | 0    | 0                         | 0     |  |  |  |
| 8:00 AM                   | 0      | 0    | 2    | 0     | 0                         | 0    | 3    | 0     | 0      | 0         | 0    | 0     | 0      | 0    | 0                         | 0     |  |  |  |
| 8:15 AM                   | 0      | 0    | 3    | 0     | 0                         | 0    | 4    | 0     | 0      | 0         | 0    | 0     | 0      | 0    | 0                         | 0     |  |  |  |
| 8:30 AM                   | 0      | 0    | 3    | 0     | 0                         | 0    | 2    | 0     | 0      | 0         | 0    | 0     | 0      | 0    | 0                         | 0     |  |  |  |
| 8:45 AM                   | 0      | 0    | 2    | 0     | 0                         | 0    | 3    | 0     | 0      | 0         | 0    | 0     | 0      | 0    | 0                         | 0     |  |  |  |

| Needham Street Northbound |        |      |      | Needham Street Southbound |        |      |      | Eastbound |        |      |      | Jaconnet Street Westbound |        |      |      |       |
|---------------------------|--------|------|------|---------------------------|--------|------|------|-----------|--------|------|------|---------------------------|--------|------|------|-------|
| Start Time                | U-Turn | Left | Thru | Right                     | U-Turn | Left | Thru | Right     | U-Turn | Left | Thru | Right                     | U-Turn | Left | Thru | Right |
| 4:00 PM                   | 0      | 0    | 1    | 0                         | 0      | 0    | 2    | 0         | 0      | 0    | 0    | 0                         | 0      | 0    | 0    | 0     |
| 4:15 PM                   | 0      | 0    | 0    | 0                         | 0      | 0    | 1    | 0         | 0      | 0    | 0    | 0                         | 0      | 0    | 0    | 0     |
| 4:30 PM                   | 0      | 0    | 1    | 0                         | 0      | 0    | 2    | 0         | 0      | 0    | 0    | 0                         | 0      | 0    | 0    | 0     |
| 4:45 PM                   | 0      | 0    | 1    | 0                         | 0      | 0    | 2    | 0         | 0      | 0    | 0    | 0                         | 0      | 0    | 0    | 0     |
| 5:00 PM                   | 0      | 0    | 2    | 0                         | 0      | 0    | 0    | 0         | 0      | 0    | 0    | 0                         | 0      | 0    | 0    | 0     |
| 5:15 PM                   | 0      | 0    | 0    | 0                         | 0      | 0    | 1    | 0         | 0      | 0    | 0    | 0                         | 0      | 0    | 0    | 0     |
| 5:30 PM                   | 0      | 0    | 1    | 0                         | 0      | 0    | 0    | 0         | 0      | 0    | 0    | 0                         | 0      | 0    | 0    | 0     |
| 5:45 PM                   | 0      | 0    | 0    | 0                         | 0      | 0    | 0    | 0         | 0      | 0    | 0    | 0                         | 0      | 0    | 0    | 0     |

| Needham Street Northbound |      |      |       | Needham Street Southbound |      |      |       | Eastbound |      |      |       | Jaconnet Street Westbound |      |      |       |
|---------------------------|------|------|-------|---------------------------|------|------|-------|-----------|------|------|-------|---------------------------|------|------|-------|
| U-Turn                    | Left | Thru | Right | U-Turn                    | Left | Thru | Right | U-Turn    | Left | Thru | Right | U-Turn                    | Left | Thru | Right |
| 0                         | 0    | 10   | 0     | 0                         | 0    | 13   | 0     | 0         | 0    | 0    | 0     | 0                         | 0    | 0    | 0     |
| PHF                       |      |      |       | PHF                       |      |      |       | PHF       |      |      |       | PHF                       |      |      |       |
| 0.83                      |      |      |       | 0.81                      |      |      |       | 0.00      |      |      |       | 0.00                      |      |      |       |

| Needham Street Northbound |      |      |       | Needham Street Southbound |      |      |       | Eastbound |      |      |       | Jaconnet Street Westbound |      |      |       |
|---------------------------|------|------|-------|---------------------------|------|------|-------|-----------|------|------|-------|---------------------------|------|------|-------|
| U-Turn                    | Left | Thru | Right | U-Turn                    | Left | Thru | Right | U-Turn    | Left | Thru | Right | U-Turn                    | Left | Thru | Right |
| 0                         | 0    | 3    | 0     | 0                         | 0    | 7    | 0     | 0         | 0    | 0    | 0     | 0                         | 0    | 0    | 0     |
| PHF                       |      |      |       | PHF                       |      |      |       | PHF       |      |      |       | PHF                       |      |      |       |
| 0.75                      |      |      |       | 0.88                      |      |      |       | 0.00      |      |      |       | 0.00                      |      |      |       |

11/6/2017, 8:36 AM, 12239.00\_127\_018\_TMC\_Loc 11

Client: Matt Duranleau  
Project #: 12239.00\_127\_018\_VHb  
BTD #: Location 11  
Location: Newton, MA  
Street 1: Needham Street  
Street 2: Jaconnet Street  
Count Date: 10/26/2017  
Day of Week: Thursday  
Weather: Rainy, 55°F



#### PEDESTRIANS & BICYCLES

| Needham Street Northbound |      |      |       |     | Needham Street Southbound |      |      |       |     | Eastbound  |      |      |       |     | Jaconnet Street Westbound |      |      |       |     |
|---------------------------|------|------|-------|-----|---------------------------|------|------|-------|-----|------------|------|------|-------|-----|---------------------------|------|------|-------|-----|
| Start Time                | Left | Thru | Right | PED | Start Time                | Left | Thru | Right | PED | Start Time | Left | Thru | Right | PED | Start Time                | Left | Thru | Right | PED |
| 7:00 AM                   | 0    | 0    | 0     | 0   | 7:00 AM                   | 0    | 0    | 0     | 0   | 7:00 AM    | 0    | 0    | 0     | 0   | 7:00 AM                   | 0    | 0    | 0     | 4   |
| 7:15 AM                   | 0    | 0    | 0     | 0   | 7:15 AM                   | 0    | 0    | 0     | 0   | 7:15 AM    | 0    | 0    | 0     | 0   | 7:15 AM                   | 0    | 0    | 0     | 2   |
| 7:30 AM                   | 0    | 0    | 0     | 0   | 7:30 AM                   | 0    | 0    | 0     | 0   | 7:30 AM    | 0    | 0    | 0     | 0   | 7:30 AM                   | 0    | 0    | 0     | 3   |
| 7:45 AM                   | 0    | 1    | 0     | 0   | 7:45 AM                   | 0    | 0    | 0     | 0   | 7:45 AM    | 0    | 0    | 0     | 0   | 7:45 AM                   | 0    | 0    | 0     | 0   |
| 8:00 AM                   | 0    | 1    | 0     | 0   | 8:00 AM                   | 0    | 0    | 0     | 1   | 8:00 AM    | 0    | 0    | 0     | 0   | 8:00 AM                   | 0    | 0    | 0     | 8   |
| 8:15 AM                   | 0    | 0    | 0     | 0   | 8:15 AM                   | 0    | 0    | 0     | 0   | 8:15 AM    | 0    | 0    | 0     | 0   | 8:15 AM                   | 0    | 0    | 0     | 4   |
| 8:30 AM                   | 0    | 0    | 0     | 0   | 8:30 AM                   | 0    | 0    | 0     | 0   | 8:30 AM    | 0    | 0    | 0     | 0   | 8:30 AM                   | 0    | 0    | 0     | 3   |
| 8:45 AM                   | 0    | 0    | 0     | 0   | 8:45 AM                   | 0    | 0    | 0     | 0   | 8:45 AM    | 0    | 0    | 0     | 0   | 8:45 AM                   | 0    | 0    | 0     | 2   |

| Needham Street Northbound |      |      |       |     | Needham Street Southbound |      |      |       |     | Eastbound  |      |      |       |     | Jaconnet Street Westbound |      |      |       |     |
|---------------------------|------|------|-------|-----|---------------------------|------|------|-------|-----|------------|------|------|-------|-----|---------------------------|------|------|-------|-----|
| Start Time                | Left | Thru | Right | PED | Start Time                | Left | Thru | Right | PED | Start Time | Left | Thru | Right | PED | Start Time                | Left | Thru | Right | PED |
| 4:00 PM                   | 0    | 0    | 0     | 1   | 4:00 PM                   | 0    | 1    | 0     | 0   | 4:00 PM    | 0    | 0    | 0     | 0   | 4:00 PM                   | 0    | 0    | 0     | 6   |
| 4:15 PM                   | 0    | 0    | 0     | 0   | 4:15 PM                   | 0    | 0    | 0     | 0   | 4:15 PM    | 0    | 0    | 0     | 0   | 4:15 PM                   | 0    | 0    | 0     | 5   |
| 4:30 PM                   | 0    | 1    | 0     | 0   | 4:30 PM                   | 0    | 0    | 0     | 0   | 4:30 PM    | 0    | 0    | 0     | 0   | 4:30 PM                   | 0    | 0    | 0     | 4   |
| 4:45 PM                   | 0    | 0    | 0     | 0   | 4:45 PM                   | 0    | 0    | 0     | 0   | 4:45 PM    | 0    | 0    | 0     | 0   | 4:45 PM                   | 0    | 0    | 0     | 7   |
| 5:00 PM                   | 0    | 1    | 0     | 0   | 5:00 PM                   | 0    | 0    | 0     | 1   | 5:00 PM    | 0    | 0    | 0     | 0   | 5:00 PM                   | 0    | 0    | 0     | 12  |
| 5:15 PM                   | 0    | 1    | 0     | 0   | 5:15 PM                   | 0    | 0    | 0     | 0   | 5:15 PM    | 0    | 0    | 0     | 0   | 5:15 PM                   | 0    | 0    | 0     | 10  |
| 5:30 PM                   | 0    | 0    | 0     | 0   | 5:30 PM                   | 0    | 0    | 0     | 0   | 5:30 PM    | 0    | 0    | 0     | 0   | 5:30 PM                   | 0    | 0    | 0     | 6   |
| 5:45 PM                   | 0    | 0    | 0     | 0   | 5:45 PM                   | 0    | 0    | 0     | 0   | 5:45 PM    | 0    | 0    | 0     | 0   | 5:45 PM                   | 0    | 0    | 0     | 9   |

| Needham Street Northbound |      |      |       |     | Needham Street Southbound |      |      |       |     | Eastbound  |      |      |       |     | Jaconnet Street Westbound |      |      |       |     |
|---------------------------|------|------|-------|-----|---------------------------|------|------|-------|-----|------------|------|------|-------|-----|---------------------------|------|------|-------|-----|
| Start Time                | Left | Thru | Right | PED | Start Time                | Left | Thru | Right | PED | Start Time | Left | Thru | Right | PED | Start Time                | Left | Thru | Right | PED |
| 7:45 AM                   | 0    | 2    | 0     | 0   | 7:45 AM                   | 0    | 0    | 0     | 1   | 7:45 AM    | 0    | 0    | 0     | 0   | 7:45 AM                   | 0    | 0    | 0     | 20  |
| 8:45 AM                   | 0    | 2    | 0     | 0   | 8:45 AM                   | 0    | 0    | 0     | 1   | 8:45 AM    | 0    | 0    | 0     | 0   | 8:45 AM                   | 0    | 0    | 0     | 20  |

| Needham Street Northbound |      |      |       |     | Needham Street Southbound |      |      |       |     | Eastbound  |      |      |       |     | Jaconnet Street Westbound |      |      |       |     |
|---------------------------|------|------|-------|-----|---------------------------|------|------|-------|-----|------------|------|------|-------|-----|---------------------------|------|------|-------|-----|
| Start Time                | Left | Thru | Right | PED | Start Time                | Left | Thru | Right | PED | Start Time | Left | Thru | Right | PED | Start Time                | Left | Thru | Right | PED |
| 4:15 PM                   | 0    | 2    | 0     | 0   | 4:15 PM                   | 0    | 0    | 0     | 1   | 4:15 PM    | 0    | 0    | 0     | 0   | 4:15 PM                   | 0    | 0    | 0     | 28  |
| 5:15 PM                   | 0    | 2    | 0     | 0   | 5:15 PM                   | 0    | 0    | 0     | 1   | 5:15 PM    | 0    | 0    | 0     | 0   | 5:15 PM                   | 0    | 0    | 0     | 28  |

\*Peak hours corresponds to vehicular peak hours.

11/6/2017, 8:36 AM, 12239.00\_127\_018\_TMC\_Loc 11

Client: Matt Duranleau  
Project #: 12239.00\_127\_018\_VHb  
BTD #: Location 12  
Location: Newton, MA  
Street 1: Needham Street  
Street 2: Rockland Street  
Count Date: 10/26/2017  
Day of Week: Thursday  
Weather: Rainy, 55°F



#### TOTAL (CARS & TRUCKS)

| Needham Street Northbound |        |      |      |       | Needham Street Southbound |        |      |      |       | Eastbound  |        |      |      |       | Rockland Street Westbound |        |      |      |       |
|---------------------------|--------|------|------|-------|---------------------------|--------|------|------|-------|------------|--------|------|------|-------|---------------------------|--------|------|------|-------|
| Start Time                | U-Turn | Left | Thru | Right | Start Time                | U-Turn | Left | Thru | Right | Start Time | U-Turn | Left | Thru | Right | Start Time                | U-Turn | Left | Thru | Right |
| 7:00 AM                   | 0      | 0    | 141  | 2     | 7:00 AM                   | 0      | 1    | 137  | 0     | 7:00 AM    | 0      | 0    | 0    | 0     | 7:00 AM                   | 0      | 2    | 0    | 2     |
| 7:15 AM                   | 0      | 0    | 147  | 2     | 7:15 AM                   | 0      | 1    | 142  | 0     | 7:15 AM    | 0      | 0    | 0    | 0     | 7:15 AM                   | 0      | 2    | 0    | 2     |
| 7:30 AM                   | 0      | 0    | 148  | 1     | 7:30 AM                   | 0      | 2    | 156  | 0     | 7:30 AM    | 0      | 0    | 0    | 0     | 7:30 AM                   | 0      | 1    | 0    | 1     |
| 7:45 AM                   | 0      | 0    | 154  | 2     | 7:45 AM                   | 0      | 2    | 163  | 0     | 7:45 AM    | 0      | 0    | 0    | 0     | 7:45 AM                   | 0      | 1    | 0    | 2     |
| 8:00 AM                   | 0      | 0    | 156  | 1     | 8:00 AM                   | 0      | 3    | 172  | 0     | 8:00 AM    | 0      | 0    | 0    | 0     | 8:00 AM                   | 0      | 0    | 0    | 2     |
| 8:15 AM                   | 0      | 0    | 154  | 2     | 8:15 AM                   | 0      | 3    | 174  | 0     | 8:15 AM    | 0      | 0    | 0    | 0     | 8:15 AM                   | 0      | 1    | 0    | 2     |
| 8:30 AM                   | 0      | 0    | 152  | 2     | 8:30 AM                   | 0      | 2    | 175  | 0     | 8:30 AM    | 0      | 0    | 0    | 0     | 8:30 AM                   | 0      | 2    | 0    | 1     |
| 8:45 AM                   | 0      | 0    | 147  | 1     | 8:45 AM                   | 0      | 1    | 169  | 0     | 8:45 AM    | 0      | 0    | 0    | 0     | 8:45 AM                   | 0      | 1    | 0    | 1     |

| Needham Street Northbound |        |      |      |       | Needham Street Southbound |        |      |      |       | Eastbound  |        |      |      |       | Rockland Street Westbound |        |      |      |       |
|---------------------------|--------|------|------|-------|---------------------------|--------|------|------|-------|------------|--------|------|------|-------|---------------------------|--------|------|------|-------|
| Start Time                | U-Turn | Left | Thru | Right | Start Time                | U-Turn | Left | Thru | Right | Start Time | U-Turn | Left | Thru | Right | Start Time                | U-Turn | Left | Thru | Right |
| 4:00 PM                   | 0      | 0    | 162  | 1     | 4:00 PM                   | 0      | 4    | 164  | 0     | 4:00 PM    | 0      | 0    | 0    | 0     | 4:00 PM                   | 0      | 0    | 0    | 0     |
| 4:15 PM                   | 0      | 0    | 171  | 2     | 4:15 PM                   | 0      | 6    | 170  | 0     | 4:15 PM    | 0      | 0    | 0    | 0     | 4:15 PM                   | 0      | 1    | 0    | 1     |
| 4:30 PM                   | 0      | 0    | 173  | 2     | 4:30 PM                   | 0      | 5    | 169  | 0     | 4:30 PM    | 0      | 0    | 0    | 0     | 4:30 PM                   | 0      | 1    | 0    | 2     |
| 4:45 PM                   | 0      | 0    | 170  | 3     | 4:45 PM                   | 0      | 4    | 162  | 0     | 4:45 PM    | 0      | 0    | 0    | 0     | 4:45 PM                   | 0      | 2    | 0    | 3     |
| 5:00 PM                   | 0      | 0    | 177  | 4     | 5:00 PM                   | 0      | 3    | 154  | 0     | 5:00 PM    | 0      | 0    | 0    | 0     | 5:00 PM                   | 0      | 1    | 0    | 4     |
| 5:15 PM                   | 0      | 0    | 175  | 4     | 5:15 PM                   | 0      | 2    | 139  | 0     | 5:15 PM    | 0      | 0    | 0    | 0     | 5:15 PM                   | 0      | 1    | 0    | 3     |
| 5:30 PM                   | 0      | 0    | 172  | 3     | 5:30 PM                   | 0      | 3    | 138  | 0     | 5:30 PM    | 0      | 0    | 0    | 0     | 5:30 PM                   | 0      | 0    | 0    | 2     |
| 5:45 PM                   | 0      | 0    | 167  | 2     | 5:45 PM                   | 0      | 2    | 132  | 0     | 5:45 PM    | 0      | 0    | 0    | 0     | 5:45 PM                   | 0      | 0    | 0    | 1     |

| Needham Street Northbound |        |      |      |       | Needham Street Southbound |        |      |      |       | Eastbound  |        |      |      |       | Rockland Street Westbound |        |      |      |       |
|---------------------------|--------|------|------|-------|---------------------------|--------|------|------|-------|------------|--------|------|------|-------|---------------------------|--------|------|------|-------|
| Start Time                | U-Turn | Left | Thru | Right | Start Time                | U-Turn | Left | Thru | Right | Start Time | U-Turn | Left | Thru | Right | Start Time                | U-Turn | Left | Thru | Right |
| 7:45 AM                   | 0      | 0    | 616  | 7     | 7:45 AM                   | 0      | 10   | 684  | 0     | 7:45 AM    | 0      | 0    | 0    | 0     | 7:45 AM                   | 0      | 4    | 0    | 7     |
| 8:45 AM                   | 0      | 0    | 616  | 7     | 8:45 AM                   | 0      | 10   | 684  | 0     | 8:45 AM    | 0      | 0    | 0    | 0     | 8:45 AM                   | 0      | 4    | 0    | 7     |
| PHF                       | 0.99   | 0.99 | 0.99 | 0.99  | PHF                       | 0.99   | 0.99 | 0.99 | 0.99  | PHF        | 0.99   | 0.99 | 0.99 | 0.99  | PHF                       | 0.99   | 0.99 | 0.99 | 0.99  |
| HV %                      | 0.0%   | 0.0% | 1.5% | 0.0%  | HV %                      | 0.0%   | 0.0% | 1.6% | 0.0%  | HV %       | 0.0%   | 0.0% | 0.0% | 0.0%  | HV %                      | 0.0%   | 0.0% | 0.0% | 0.0%  |

| Needham Street Northbound |        |      |      |       | Needham Street Southbound |        |      |      |       | Eastbound  |        |      |      |       | Rockland Street Westbound |        |      |      |       |
|---------------------------|--------|------|------|-------|---------------------------|--------|------|------|-------|------------|--------|------|------|-------|---------------------------|--------|------|------|-------|
| Start Time                | U-Turn | Left | Thru | Right | Start Time                | U-Turn | Left | Thru | Right | Start Time | U-Turn | Left | Thru | Right | Start Time                | U-Turn | Left | Thru | Right |
| 4:15 PM                   | 0      | 0    | 691  | 11    | 4:15 PM                   | 0      | 18   | 655  | 0     | 4:15 PM    | 0      | 0    | 0    | 0     | 4:15 PM                   | 0      | 5    | 0    | 10    |
| 5:15 PM                   | 0      | 0    | 691  | 11    | 5:15 PM                   | 0      | 18   | 655  | 0     | 5:15 PM    | 0      | 0    | 0    | 0     | 5:15 PM                   | 0      | 5    | 0    | 10    |
| PHF                       | 0.97   | 0.97 | 0.97 | 0.97  | PHF                       | 0.97   | 0.97 | 0.97 | 0.97  | PHF        | 0.97   | 0.97 | 0.97 | 0.97  | PHF                       | 0.97   | 0.97 | 0.97 | 0.97  |
| HV %                      | 0.0%   | 0.0% | 0.4% | 0.0%  | HV %                      | 0.0%   | 0.0% | 0.8% | 0.0%  | HV %       | 0.0%   | 0.0% | 0.0% | 0.0%  | HV %                      | 0.0%   | 0.0% | 0.0% | 0.0%  |

11/6/2017, 8:37 AM, 12239.00\_127\_018\_TMC\_Loc 12

Client: Matt Duranleau  
Project #: 12239.00\_127\_018\_VHb  
BTD #: Location 12  
Location: Newton, MA  
Street 1: Needham Street  
Street 2: Rockland Street  
Count Date: 10/26/2017  
Day of Week: Thursday  
Weather: Rainy, 55°F



#### TRUCKS

| Start Time | Needham Street Northbound |      |      |       | Needham Street Southbound |      |      |       | Eastbound |      |      |       | Rockland Street Westbound |      |      |       |
|------------|---------------------------|------|------|-------|---------------------------|------|------|-------|-----------|------|------|-------|---------------------------|------|------|-------|
|            | U-Turn                    | Left | Thru | Right | U-Turn                    | Left | Thru | Right | U-Turn    | Left | Thru | Right | U-Turn                    | Left | Thru | Right |
| 7:00 AM    | 0                         | 0    | 1    | 0     | 0                         | 0    | 3    | 0     | 0         | 0    | 0    | 0     | 0                         | 0    | 0    | 0     |
| 7:15 AM    | 0                         | 0    | 2    | 0     | 0                         | 0    | 2    | 0     | 0         | 0    | 0    | 0     | 0                         | 0    | 0    | 0     |
| 7:30 AM    | 0                         | 0    | 4    | 0     | 0                         | 0    | 4    | 0     | 0         | 0    | 0    | 0     | 0                         | 0    | 0    | 0     |
| 7:45 AM    | 0                         | 0    | 1    | 0     | 0                         | 0    | 2    | 0     | 0         | 0    | 0    | 0     | 0                         | 0    | 0    | 0     |
| 8:00 AM    | 0                         | 0    | 2    | 0     | 0                         | 0    | 4    | 0     | 0         | 0    | 0    | 0     | 0                         | 0    | 0    | 0     |
| 8:15 AM    | 0                         | 0    | 3    | 0     | 0                         | 0    | 3    | 0     | 0         | 0    | 0    | 0     | 0                         | 0    | 0    | 0     |
| 8:30 AM    | 0                         | 0    | 3    | 0     | 0                         | 0    | 2    | 0     | 0         | 0    | 0    | 0     | 0                         | 0    | 0    | 0     |
| 8:45 AM    | 0                         | 0    | 2    | 0     | 0                         | 0    | 3    | 0     | 0         | 0    | 0    | 0     | 0                         | 0    | 0    | 0     |

| Start Time | Needham Street Northbound |      |      |       | Needham Street Southbound |      |      |       | Eastbound |      |      |       | Rockland Street Westbound |      |      |       |
|------------|---------------------------|------|------|-------|---------------------------|------|------|-------|-----------|------|------|-------|---------------------------|------|------|-------|
|            | U-Turn                    | Left | Thru | Right | U-Turn                    | Left | Thru | Right | U-Turn    | Left | Thru | Right | U-Turn                    | Left | Thru | Right |
| 4:00 PM    | 0                         | 0    | 1    | 0     | 0                         | 0    | 2    | 0     | 0         | 0    | 0    | 0     | 0                         | 0    | 0    | 0     |
| 4:15 PM    | 0                         | 0    | 0    | 0     | 0                         | 0    | 2    | 0     | 0         | 0    | 0    | 0     | 0                         | 0    | 0    | 0     |
| 4:30 PM    | 0                         | 0    | 1    | 0     | 0                         | 0    | 1    | 0     | 0         | 0    | 0    | 0     | 0                         | 0    | 0    | 0     |
| 4:45 PM    | 0                         | 0    | 0    | 0     | 0                         | 0    | 2    | 0     | 0         | 0    | 0    | 0     | 0                         | 0    | 0    | 0     |
| 5:00 PM    | 0                         | 0    | 2    | 0     | 0                         | 0    | 0    | 0     | 0         | 0    | 0    | 0     | 0                         | 0    | 0    | 0     |
| 5:15 PM    | 0                         | 0    | 1    | 0     | 0                         | 0    | 1    | 0     | 0         | 0    | 0    | 0     | 0                         | 0    | 0    | 0     |
| 5:30 PM    | 0                         | 0    | 1    | 0     | 0                         | 0    | 0    | 0     | 0         | 0    | 0    | 0     | 0                         | 0    | 0    | 0     |
| 5:45 PM    | 0                         | 0    | 0    | 0     | 0                         | 0    | 0    | 0     | 0         | 0    | 0    | 0     | 0                         | 0    | 0    | 0     |

| AM PEAK HOUR<br>7:30 AM<br>to<br>8:30 AM<br>PHF | Needham Street Northbound |      |      |       | Needham Street Southbound |      |      |       | Eastbound |      |      |       | Rockland Street Westbound |      |      |       |
|-------------------------------------------------|---------------------------|------|------|-------|---------------------------|------|------|-------|-----------|------|------|-------|---------------------------|------|------|-------|
|                                                 | U-Turn                    | Left | Thru | Right | U-Turn                    | Left | Thru | Right | U-Turn    | Left | Thru | Right | U-Turn                    | Left | Thru | Right |
|                                                 | 0                         | 0    | 10   | 0     | 0                         | 0    | 13   | 0     | 0         | 0    | 0    | 0     | 0                         | 0    | 0    | 0     |
|                                                 | 0.63                      |      |      |       | 0.81                      |      |      |       | 0.00      |      |      |       | 0.00                      |      |      |       |

| PM PEAK HOUR<br>4:00 PM<br>to<br>5:00 PM<br>PHF | Needham Street Northbound |      |      |       | Needham Street Southbound |      |      |       | Eastbound |      |      |       | Rockland Street Westbound |      |      |       |
|-------------------------------------------------|---------------------------|------|------|-------|---------------------------|------|------|-------|-----------|------|------|-------|---------------------------|------|------|-------|
|                                                 | U-Turn                    | Left | Thru | Right | U-Turn                    | Left | Thru | Right | U-Turn    | Left | Thru | Right | U-Turn                    | Left | Thru | Right |
|                                                 | 0                         | 0    | 2    | 0     | 0                         | 0    | 7    | 0     | 0         | 0    | 0    | 0     | 0                         | 0    | 0    | 0     |
|                                                 | 0.50                      |      |      |       | 0.88                      |      |      |       | 0.00      |      |      |       | 0.00                      |      |      |       |

Client: Matt Duranleau  
Project #: 12239.00\_127\_018\_VHb  
BTD #: Location 12  
Location: Newton, MA  
Street 1: Needham Street  
Street 2: Rockland Street  
Count Date: 10/26/2017  
Day of Week: Thursday  
Weather: Rainy, 55°F



#### PEDESTRIANS & BICYCLES

| Start Time | Needham Street Northbound |      |       |     | Needham Street Southbound |      |       |     | Eastbound |      |       |     | Rockland Street Westbound |      |       |     |
|------------|---------------------------|------|-------|-----|---------------------------|------|-------|-----|-----------|------|-------|-----|---------------------------|------|-------|-----|
|            | Left                      | Thru | Right | PED | Left                      | Thru | Right | PED | Left      | Thru | Right | PED | Left                      | Thru | Right | PED |
| 7:00 AM    | 0                         | 0    | 0     | 0   | 0                         | 0    | 0     | 0   | 0         | 0    | 0     | 0   | 0                         | 0    | 0     | 2   |
| 7:15 AM    | 0                         | 0    | 0     | 0   | 0                         | 0    | 0     | 0   | 0         | 0    | 0     | 0   | 0                         | 0    | 0     | 0   |
| 7:30 AM    | 0                         | 0    | 0     | 0   | 0                         | 0    | 0     | 0   | 0         | 0    | 0     | 0   | 0                         | 0    | 0     | 1   |
| 7:45 AM    | 0                         | 0    | 0     | 0   | 0                         | 0    | 0     | 0   | 0         | 0    | 0     | 0   | 0                         | 0    | 0     | 4   |
| 8:00 AM    | 0                         | 1    | 0     | 0   | 0                         | 0    | 0     | 0   | 0         | 0    | 0     | 0   | 0                         | 0    | 0     | 2   |
| 8:15 AM    | 0                         | 1    | 0     | 1   | 0                         | 0    | 0     | 0   | 0         | 0    | 0     | 0   | 0                         | 0    | 0     | 3   |
| 8:30 AM    | 0                         | 0    | 0     | 0   | 0                         | 0    | 0     | 0   | 0         | 0    | 0     | 0   | 0                         | 0    | 0     | 2   |
| 8:45 AM    | 0                         | 0    | 0     | 0   | 0                         | 0    | 0     | 0   | 0         | 0    | 0     | 0   | 0                         | 0    | 0     | 2   |

| Start Time | Needham Street Northbound |      |       |     | Needham Street Southbound |      |       |     | Eastbound |      |       |     | Rockland Street Westbound |      |       |     |
|------------|---------------------------|------|-------|-----|---------------------------|------|-------|-----|-----------|------|-------|-----|---------------------------|------|-------|-----|
|            | Left                      | Thru | Right | PED | Left                      | Thru | Right | PED | Left      | Thru | Right | PED | Left                      | Thru | Right | PED |
| 4:00 PM    | 0                         | 0    | 0     | 0   | 0                         | 1    | 0     | 0   | 0         | 0    | 0     | 0   | 0                         | 0    | 0     | 0   |
| 4:15 PM    | 0                         | 0    | 0     | 4   | 0                         | 0    | 0     | 0   | 0         | 0    | 0     | 0   | 0                         | 0    | 0     | 3   |
| 4:30 PM    | 0                         | 0    | 0     | 1   | 0                         | 0    | 0     | 0   | 0         | 0    | 0     | 0   | 0                         | 0    | 0     | 1   |
| 4:45 PM    | 0                         | 1    | 0     | 0   | 0                         | 0    | 0     | 0   | 0         | 0    | 0     | 0   | 0                         | 0    | 0     | 1   |
| 5:00 PM    | 0                         | 1    | 0     | 0   | 0                         | 0    | 0     | 0   | 0         | 0    | 0     | 0   | 0                         | 0    | 0     | 2   |
| 5:15 PM    | 0                         | 1    | 0     | 0   | 0                         | 0    | 0     | 0   | 0         | 0    | 0     | 0   | 0                         | 0    | 0     | 3   |
| 5:30 PM    | 0                         | 0    | 0     | 0   | 0                         | 0    | 0     | 0   | 0         | 0    | 0     | 0   | 0                         | 0    | 0     | 1   |
| 5:45 PM    | 0                         | 0    | 0     | 0   | 0                         | 0    | 0     | 0   | 0         | 0    | 0     | 0   | 0                         | 0    | 0     | 5   |

| AM PEAK HOUR<br>7:45 AM<br>to<br>8:45 AM | Needham Street Northbound |      |       |     | Needham Street Southbound |      |       |     | Eastbound |      |       |     | Rockland Street Westbound |      |       |     |
|------------------------------------------|---------------------------|------|-------|-----|---------------------------|------|-------|-----|-----------|------|-------|-----|---------------------------|------|-------|-----|
|                                          | Left                      | Thru | Right | PED | Left                      | Thru | Right | PED | Left      | Thru | Right | PED | Left                      | Thru | Right | PED |
|                                          | 0                         | 2    | 0     | 1   | 0                         | 0    | 0     | 0   | 0         | 0    | 0     | 0   | 0                         | 0    | 0     | 11  |

| PM PEAK HOUR<br>4:15 PM<br>to<br>5:15 PM | Needham Street Northbound |      |       |     | Needham Street Southbound |      |       |     | Eastbound |      |       |     | Rockland Street Westbound |      |       |     |
|------------------------------------------|---------------------------|------|-------|-----|---------------------------|------|-------|-----|-----------|------|-------|-----|---------------------------|------|-------|-----|
|                                          | Left                      | Thru | Right | PED | Left                      | Thru | Right | PED | Left      | Thru | Right | PED | Left                      | Thru | Right | PED |
|                                          | 0                         | 2    | 0     | 5   | 0                         | 0    | 0     | 0   | 0         | 0    | 0     | 0   | 0                         | 0    | 0     | 7   |

\*Peak hour corresponds to vehicular peak hours.

Client: Matt Duranleau  
Project #: 12239.00\_127\_018\_VHb  
BTD #: Location 13  
Location: Newton, MA  
Street 1: Centre Street  
Street 2: Walnut Street  
Count Date: 10/26/2017  
Day of Week: Thursday  
Weather: Rainy, 55°F



**TOTAL (CARS & TRUCKS)**

| Start Time | Centre Street Northbound |      |      | Centre Street Southbound |        |      | Walnut Street Eastbound |       |        | Walnut Street Westbound |      |       |
|------------|--------------------------|------|------|--------------------------|--------|------|-------------------------|-------|--------|-------------------------|------|-------|
|            | U-Turn                   | Left | Thru | Right                    | U-Turn | Left | Thru                    | Right | U-Turn | Left                    | Thru | Right |
| 7:00 AM    | 0                        | 56   | 112  | 1                        | 0      | 0    | 93                      | 6     | 0      | 9                       | 0    | 78    |
| 7:15 AM    | 0                        | 64   | 122  | 0                        | 0      | 0    | 96                      | 7     | 0      | 9                       | 0    | 80    |
| 7:30 AM    | 0                        | 69   | 127  | 0                        | 0      | 0    | 110                     | 9     | 0      | 8                       | 1    | 79    |
| 7:45 AM    | 0                        | 77   | 136  | 1                        | 0      | 0    | 119                     | 8     | 0      | 7                       | 1    | 75    |
| 8:00 AM    | 0                        | 81   | 140  | 0                        | 0      | 0    | 129                     | 9     | 0      | 6                       | 0    | 74    |
| 8:15 AM    | 0                        | 80   | 139  | 1                        | 0      | 0    | 134                     | 8     | 0      | 4                       | 1    | 72    |
| 8:30 AM    | 0                        | 75   | 133  | 1                        | 0      | 1    | 133                     | 8     | 0      | 5                       | 0    | 73    |
| 8:45 AM    | 0                        | 72   | 128  | 0                        | 0      | 0    | 126                     | 7     | 0      | 4                       | 0    | 70    |

| Start Time | Centre Street Northbound |      |      | Centre Street Southbound |        |      | Walnut Street Eastbound |       |        | Walnut Street Westbound |      |       |
|------------|--------------------------|------|------|--------------------------|--------|------|-------------------------|-------|--------|-------------------------|------|-------|
|            | U-Turn                   | Left | Thru | Right                    | U-Turn | Left | Thru                    | Right | U-Turn | Left                    | Thru | Right |
| 4:00 PM    | 0                        | 80   | 86   | 1                        | 0      | 0    | 139                     | 13    | 0      | 5                       | 0    | 91    |
| 4:15 PM    | 0                        | 83   | 92   | 2                        | 0      | 1    | 143                     | 14    | 0      | 6                       | 1    | 94    |
| 4:30 PM    | 0                        | 82   | 95   | 2                        | 0      | 0    | 140                     | 15    | 0      | 8                       | 0    | 93    |
| 4:45 PM    | 0                        | 81   | 104  | 3                        | 0      | 1    | 131                     | 15    | 0      | 7                       | 1    | 89    |
| 5:00 PM    | 0                        | 77   | 109  | 3                        | 0      | 1    | 124                     | 16    | 0      | 6                       | 0    | 88    |
| 5:15 PM    | 0                        | 78   | 108  | 2                        | 0      | 0    | 112                     | 14    | 0      | 7                       | 1    | 83    |
| 5:30 PM    | 0                        | 75   | 102  | 1                        | 0      | 0    | 110                     | 13    | 0      | 8                       | 1    | 84    |
| 5:45 PM    | 0                        | 71   | 96   | 0                        | 0      | 0    | 107                     | 12    | 0      | 6                       | 0    | 81    |

| AM PEAK HOUR<br>7:45 AM to 8:45 AM<br>PHF<br>HV % | Centre Street Northbound |      |      | Centre Street Southbound |        |      | Walnut Street Eastbound |       |        | Walnut Street Westbound |      |       |
|---------------------------------------------------|--------------------------|------|------|--------------------------|--------|------|-------------------------|-------|--------|-------------------------|------|-------|
|                                                   | U-Turn                   | Left | Thru | Right                    | U-Turn | Left | Thru                    | Right | U-Turn | Left                    | Thru | Right |
|                                                   | 0                        | 313  | 548  | 3                        | 0      | 1    | 515                     | 33    | 0      | 22                      | 2    | 294   |
|                                                   | 0.98                     |      |      | 0.97                     |        |      | 0.96                    |       |        | 0.90                    |      |       |
|                                                   | 0.0%                     | 1.6% | 2.2% | 0.0%                     | 0.0%   | 0.0% | 0.4%                    | 3.0%  | 0.0%   | 0.0%                    | 0.0% | 0.3%  |

| PM PEAK HOUR<br>4:15 PM to 5:15 PM<br>PHF<br>HV % | Centre Street Northbound |      |      | Centre Street Southbound |        |      | Walnut Street Eastbound |       |        | Walnut Street Westbound |      |       |
|---------------------------------------------------|--------------------------|------|------|--------------------------|--------|------|-------------------------|-------|--------|-------------------------|------|-------|
|                                                   | U-Turn                   | Left | Thru | Right                    | U-Turn | Left | Thru                    | Right | U-Turn | Left                    | Thru | Right |
|                                                   | 0                        | 323  | 400  | 10                       | 0      | 3    | 538                     | 60    | 0      | 27                      | 2    | 364   |
|                                                   | 0.97                     |      |      | 0.95                     |        |      | 0.97                    |       |        | 0.93                    |      |       |
|                                                   | 0.0%                     | 0.3% | 0.8% | 0.0%                     | 0.0%   | 0.0% | 0.4%                    | 1.7%  | 0.0%   | 0.0%                    | 0.0% | 0.3%  |

11/6/2017, 8:39 AM, 12239.00\_127\_018\_TMC\_Loc 13

Client: Matt Duranleau  
Project #: 12239.00\_127\_018\_VHb  
BTD #: Location 13  
Location: Newton, MA  
Street 1: Centre Street  
Street 2: Walnut Street  
Count Date: 10/26/2017  
Day of Week: Thursday  
Weather: Rainy, 55°F



**TRUCKS**

| Start Time | Centre Street Northbound |      |      | Centre Street Southbound |        |      | Walnut Street Eastbound |       |        | Walnut Street Westbound |      |       |
|------------|--------------------------|------|------|--------------------------|--------|------|-------------------------|-------|--------|-------------------------|------|-------|
|            | U-Turn                   | Left | Thru | Right                    | U-Turn | Left | Thru                    | Right | U-Turn | Left                    | Thru | Right |
| 7:00 AM    | 0                        | 1    | 2    | 0                        | 0      | 0    | 1                       | 0     | 0      | 0                       | 0    | 0     |
| 7:15 AM    | 0                        | 1    | 2    | 0                        | 0      | 0    | 1                       | 0     | 0      | 0                       | 0    | 0     |
| 7:30 AM    | 0                        | 2    | 3    | 0                        | 0      | 0    | 0                       | 0     | 0      | 1                       | 0    | 0     |
| 7:45 AM    | 0                        | 0    | 6    | 0                        | 0      | 0    | 0                       | 1     | 0      | 0                       | 0    | 1     |
| 8:00 AM    | 0                        | 1    | 3    | 0                        | 0      | 0    | 1                       | 0     | 0      | 0                       | 0    | 0     |
| 8:15 AM    | 0                        | 2    | 2    | 0                        | 0      | 0    | 0                       | 0     | 0      | 1                       | 0    | 0     |
| 8:30 AM    | 0                        | 2    | 1    | 0                        | 0      | 0    | 1                       | 0     | 0      | 0                       | 0    | 0     |
| 8:45 AM    | 0                        | 2    | 1    | 0                        | 0      | 0    | 0                       | 0     | 0      | 0                       | 0    | 0     |

| Start Time | Centre Street Northbound |      |      | Centre Street Southbound |        |      | Walnut Street Eastbound |       |        | Walnut Street Westbound |      |       |
|------------|--------------------------|------|------|--------------------------|--------|------|-------------------------|-------|--------|-------------------------|------|-------|
|            | U-Turn                   | Left | Thru | Right                    | U-Turn | Left | Thru                    | Right | U-Turn | Left                    | Thru | Right |
| 4:00 PM    | 0                        | 1    | 0    | 0                        | 0      | 0    | 1                       | 0     | 0      | 0                       | 0    | 1     |
| 4:15 PM    | 0                        | 0    | 1    | 0                        | 0      | 0    | 1                       | 0     | 0      | 0                       | 0    | 1     |
| 4:30 PM    | 0                        | 0    | 1    | 0                        | 0      | 0    | 0                       | 0     | 0      | 1                       | 0    | 0     |
| 4:45 PM    | 0                        | 1    | 0    | 0                        | 0      | 0    | 1                       | 0     | 0      | 0                       | 0    | 0     |
| 5:00 PM    | 0                        | 0    | 1    | 0                        | 0      | 0    | 0                       | 1     | 0      | 0                       | 0    | 0     |
| 5:15 PM    | 0                        | 1    | 0    | 0                        | 0      | 0    | 1                       | 0     | 0      | 0                       | 0    | 0     |
| 5:30 PM    | 0                        | 0    | 0    | 0                        | 0      | 0    | 0                       | 0     | 0      | 0                       | 0    | 0     |
| 5:45 PM    | 0                        | 0    | 0    | 0                        | 0      | 0    | 0                       | 0     | 0      | 0                       | 0    | 0     |

| AM PEAK HOUR<br>7:30 AM to 8:30 AM<br>PHF | Centre Street Northbound |      |      | Centre Street Southbound |        |      | Walnut Street Eastbound |       |        | Walnut Street Westbound |      |       |
|-------------------------------------------|--------------------------|------|------|--------------------------|--------|------|-------------------------|-------|--------|-------------------------|------|-------|
|                                           | U-Turn                   | Left | Thru | Right                    | U-Turn | Left | Thru                    | Right | U-Turn | Left                    | Thru | Right |
|                                           | 0                        | 5    | 14   | 0                        | 0      | 0    | 1                       | 1     | 0      | 0                       | 2    | 0     |
|                                           | 0.79                     |      |      | 0.50                     |        |      | 0.50                    |       |        | 0.25                    |      |       |

| PM PEAK HOUR<br>4:00 PM to 5:00 PM<br>PHF | Centre Street Northbound |      |      | Centre Street Southbound |        |      | Walnut Street Eastbound |       |        | Walnut Street Westbound |      |       |
|-------------------------------------------|--------------------------|------|------|--------------------------|--------|------|-------------------------|-------|--------|-------------------------|------|-------|
|                                           | U-Turn                   | Left | Thru | Right                    | U-Turn | Left | Thru                    | Right | U-Turn | Left                    | Thru | Right |
|                                           | 0                        | 2    | 2    | 0                        | 0      | 0    | 3                       | 0     | 0      | 0                       | 1    | 0     |
|                                           | 1.00                     |      |      | 0.75                     |        |      | 0.25                    |       |        | 0.50                    |      |       |

11/6/2017, 8:39 AM, 12239.00\_127\_018\_TMC\_Loc 13

Client: Matt Duranleau  
Project #: 12239.00\_127\_018\_VHb  
BTD #: Location 13  
Location: Newton, MA  
Street 1: Centre Street  
Street 2: Walnut Street  
Count Date: 10/26/2017  
Day of Week: Thursday  
Weather: Rainy, 55°F



PEDESTRIANS & BICYCLES

| Centre Street Northbound |      |      |       |     | Centre Street Southbound |      |      |       |     | Walnut Street Eastbound |      |      |       |     | Walnut Street Westbound |      |      |       |     |
|--------------------------|------|------|-------|-----|--------------------------|------|------|-------|-----|-------------------------|------|------|-------|-----|-------------------------|------|------|-------|-----|
| Start Time               | Left | Thru | Right | PED | Start Time               | Left | Thru | Right | PED | Start Time              | Left | Thru | Right | PED | Start Time              | Left | Thru | Right | PED |
| 7:00 AM                  | 0    | 0    | 0     | 2   | 0                        | 0    | 0    | 3     | 0   | 0                       | 0    | 1    | 0     | 0   | 0                       | 0    | 0    | 0     | 5   |
| 7:15 AM                  | 0    | 0    | 0     | 0   | 0                        | 0    | 0    | 1     | 0   | 0                       | 0    | 0    | 0     | 0   | 0                       | 0    | 0    | 0     | 3   |
| 7:30 AM                  | 0    | 0    | 0     | 1   | 0                        | 0    | 0    | 2     | 0   | 0                       | 0    | 2    | 0     | 0   | 0                       | 0    | 0    | 0     | 2   |
| 7:45 AM                  | 0    | 1    | 0     | 0   | 0                        | 0    | 0    | 0     | 4   | 0                       | 0    | 0    | 0     | 0   | 0                       | 0    | 0    | 0     | 1   |
| 8:00 AM                  | 0    | 0    | 0     | 1   | 0                        | 0    | 0    | 8     | 0   | 0                       | 0    | 0    | 1     | 0   | 0                       | 0    | 0    | 0     | 4   |
| 8:15 AM                  | 0    | 0    | 0     | 2   | 0                        | 0    | 1    | 3     | 0   | 0                       | 0    | 1    | 0     | 0   | 0                       | 0    | 0    | 0     | 2   |
| 8:30 AM                  | 0    | 0    | 0     | 0   | 0                        | 0    | 0    | 4     | 0   | 0                       | 0    | 1    | 0     | 0   | 0                       | 0    | 0    | 0     | 1   |
| 8:45 AM                  | 0    | 0    | 0     | 1   | 0                        | 0    | 0    | 2     | 0   | 0                       | 0    | 0    | 0     | 0   | 0                       | 0    | 0    | 0     | 2   |

| Centre Street Northbound |      |      |       |     | Centre Street Southbound |      |      |       |     | Walnut Street Eastbound |      |      |       |     | Walnut Street Westbound |      |      |       |     |
|--------------------------|------|------|-------|-----|--------------------------|------|------|-------|-----|-------------------------|------|------|-------|-----|-------------------------|------|------|-------|-----|
| Start Time               | Left | Thru | Right | PED | Start Time               | Left | Thru | Right | PED | Start Time              | Left | Thru | Right | PED | Start Time              | Left | Thru | Right | PED |
| 4:00 PM                  | 0    | 0    | 0     | 3   | 0                        | 0    | 0    | 0     | 0   | 0                       | 0    | 1    | 2     | 0   | 0                       | 0    | 0    | 0     | 1   |
| 4:15 PM                  | 0    | 0    | 0     | 4   | 0                        | 0    | 0    | 4     | 0   | 0                       | 0    | 0    | 0     | 0   | 0                       | 0    | 0    | 0     | 3   |
| 4:30 PM                  | 0    | 0    | 0     | 3   | 0                        | 0    | 0    | 2     | 0   | 0                       | 0    | 1    | 0     | 0   | 0                       | 0    | 0    | 0     | 1   |
| 4:45 PM                  | 0    | 0    | 0     | 2   | 0                        | 0    | 0    | 3     | 0   | 0                       | 0    | 2    | 0     | 0   | 0                       | 0    | 0    | 0     | 2   |
| 5:00 PM                  | 0    | 0    | 0     | 3   | 0                        | 0    | 0    | 2     | 0   | 0                       | 0    | 0    | 0     | 0   | 0                       | 0    | 0    | 0     | 2   |
| 5:15 PM                  | 0    | 0    | 0     | 2   | 0                        | 0    | 0    | 4     | 0   | 0                       | 0    | 1    | 0     | 0   | 0                       | 0    | 0    | 0     | 3   |
| 5:30 PM                  | 0    | 0    | 0     | 1   | 0                        | 0    | 0    | 2     | 0   | 0                       | 0    | 1    | 0     | 0   | 0                       | 0    | 0    | 0     | 2   |
| 5:45 PM                  | 0    | 0    | 0     | 2   | 0                        | 0    | 0    | 2     | 0   | 0                       | 0    | 0    | 0     | 0   | 0                       | 0    | 0    | 0     | 2   |

| Centre Street Northbound |      |      |       |     | Centre Street Southbound |      |       |     |      | Walnut Street Eastbound |       |     |      |      | Walnut Street Westbound |      |      |       |     |
|--------------------------|------|------|-------|-----|--------------------------|------|-------|-----|------|-------------------------|-------|-----|------|------|-------------------------|------|------|-------|-----|
| 7:45 AM to 8:45 AM       | Left | Thru | Right | PED | Left                     | Thru | Right | PED | Left | Thru                    | Right | PED | Left | Thru | Right                   | Left | Thru | Right | PED |
|                          | 0    | 1    | 0     | 3   | 0                        | 0    | 1     | 19  | 0    | 0                       | 0     | 3   | 0    | 0    | 0                       | 0    | 0    | 0     | 8   |

| Centre Street Northbound |      |      |       |     | Centre Street Southbound |      |       |     |      | Walnut Street Eastbound |       |     |      |      | Walnut Street Westbound |      |      |       |     |
|--------------------------|------|------|-------|-----|--------------------------|------|-------|-----|------|-------------------------|-------|-----|------|------|-------------------------|------|------|-------|-----|
| 4:15 PM to 5:15 PM       | Left | Thru | Right | PED | Left                     | Thru | Right | PED | Left | Thru                    | Right | PED | Left | Thru | Right                   | Left | Thru | Right | PED |
|                          | 0    | 0    | 0     | 12  | 0                        | 0    | 0     | 11  | 0    | 0                       | 0     | 3   | 0    | 0    | 0                       | 0    | 0    | 0     | 8   |

\*Peak hours corresponds to vehicular peak hours.

11/6/2017, 8:39 AM, 12239.00\_127\_018\_TMC\_Loc 13

Client: Matt Duranleau  
Project #: 12239.00\_127\_018\_VHb  
BTD #: Location 14  
Location: Newton, MA  
Street 1: Nahanton Street  
Street 2: Wells Avenue / Winchester Street  
Count Date: 10/26/2017  
Day of Week: Thursday  
Weather: Rainy, 55°F



TOTAL (CARS & TRUCKS)

| Wells Avenue Northbound |        |      |      |       | Winchester Street Southbound |        |      |      |       | Nahanton Street Eastbound |        |      |      |       | Nahanton Street Westbound |        |      |      |       |
|-------------------------|--------|------|------|-------|------------------------------|--------|------|------|-------|---------------------------|--------|------|------|-------|---------------------------|--------|------|------|-------|
| Start Time              | U-Turn | Left | Thru | Right | Start Time                   | U-Turn | Left | Thru | Right | Start Time                | U-Turn | Left | Thru | Right | Start Time                | U-Turn | Left | Thru | Right |
| 7:00 AM                 | 0      | 6    | 3    | 10    | 0                            | 4      | 0    | 4    | 0     | 9                         | 163    | 37   | 0    | 25    | 64                        | 17     | 0    | 25   | 64    |
| 7:15 AM                 | 0      | 11   | 5    | 17    | 0                            | 5      | 0    | 4    | 0     | 11                        | 169    | 40   | 0    | 38    | 80                        | 25     | 0    | 38   | 80    |
| 7:30 AM                 | 0      | 16   | 4    | 23    | 0                            | 8      | 1    | 7    | 0     | 13                        | 165    | 47   | 0    | 49    | 92                        | 32     | 0    | 49   | 92    |
| 7:45 AM                 | 0      | 21   | 6    | 29    | 0                            | 11     | 1    | 9    | 0     | 14                        | 154    | 53   | 0    | 59    | 111                       | 39     | 0    | 59   | 111   |
| 8:00 AM                 | 0      | 25   | 5    | 34    | 0                            | 15     | 3    | 12   | 0     | 16                        | 147    | 62   | 0    | 67    | 126                       | 45     | 0    | 67   | 126   |
| 8:15 AM                 | 0      | 23   | 3    | 31    | 0                            | 19     | 2    | 14   | 0     | 17                        | 135    | 69   | 0    | 65    | 122                       | 43     | 0    | 65   | 122   |
| 8:30 AM                 | 0      | 21   | 4    | 32    | 0                            | 17     | 2    | 13   | 0     | 16                        | 132    | 67   | 0    | 61    | 113                       | 39     | 0    | 61   | 113   |
| 8:45 AM                 | 0      | 19   | 3    | 29    | 0                            | 14     | 1    | 11   | 0     | 15                        | 129    | 62   | 0    | 58    | 108                       | 34     | 0    | 58   | 108   |

| Wells Avenue Northbound |        |      |      |       | Winchester Street Southbound |        |      |      |       | Nahanton Street Eastbound |        |      |      |       | Nahanton Street Westbound |        |      |      |       |
|-------------------------|--------|------|------|-------|------------------------------|--------|------|------|-------|---------------------------|--------|------|------|-------|---------------------------|--------|------|------|-------|
| Start Time              | U-Turn | Left | Thru | Right | Start Time                   | U-Turn | Left | Thru | Right | Start Time                | U-Turn | Left | Thru | Right | Start Time                | U-Turn | Left | Thru | Right |
| 4:00 PM                 | 0      | 79   | 2    | 54    | 0                            | 20     | 2    | 20   | 0     | 9                         | 91     | 22   | 0    | 39    | 135                       | 12     | 0    | 39   | 135   |
| 4:15 PM                 | 0      | 83   | 3    | 60    | 0                            | 22     | 1    | 20   | 0     | 10                        | 96     | 25   | 0    | 36    | 132                       | 14     | 0    | 36   | 132   |
| 4:30 PM                 | 0      | 84   | 4    | 63    | 0                            | 25     | 1    | 18   | 0     | 12                        | 108    | 24   | 0    | 37    | 133                       | 13     | 0    | 37   | 133   |
| 4:45 PM                 | 0      | 101  | 6    | 78    | 0                            | 27     | 0    | 16   | 0     | 11                        | 115    | 27   | 0    | 38    | 138                       | 14     | 0    | 38   | 138   |
| 5:00 PM                 | 0      | 114  | 5    | 89    | 0                            | 30     | 0    | 14   | 0     | 12                        | 122    | 28   | 0    | 35    | 137                       | 15     | 0    | 35   | 137   |
| 5:15 PM                 | 0      | 111  | 5    | 87    | 0                            | 31     | 1    | 12   | 0     | 11                        | 124    | 26   | 0    | 34    | 135                       | 16     | 0    | 34   | 135   |
| 5:30 PM                 | 0      | 103  | 4    | 82    | 0                            | 28     | 1    | 13   | 0     | 13                        | 121    | 27   | 0    | 31    | 132                       | 14     | 0    | 31   | 132   |
| 5:45 PM                 | 0      | 97   | 2    | 77    | 0                            | 29     | 0    | 12   | 0     | 10                        | 117    | 24   | 0    | 28    | 128                       | 11     | 0    | 28   | 128   |

| AM PEAK HOUR<br>7:45 AM<br>to<br>8:45 AM |  | Wells Avenue<br>Northbound |      |      |       | Winchester Street<br>Southbound |      |      |       | Nahanton Street<br>Eastbound |      |      |       | Nahanton Street<br>Westbound |      |      |       |
|------------------------------------------|--|----------------------------|------|------|-------|---------------------------------|------|------|-------|------------------------------|------|------|-------|------------------------------|------|------|-------|
|                                          |  | U-Turn                     | Left | Thru | Right | U-Turn                          | Left | Thru | Right | U-Turn                       | Left | Thru | Right | U-Turn                       | Left | Thru | Right |
|                                          |  | 0                          | 90   | 18   | 126   | 0                               | 62   | 8    | 48    | 0                            | 63   | 568  | 251   | 0                            | 252  | 472  | 166   |
| PHF                                      |  | 0.91                       |      |      |       | 0.84                            |      |      |       | 0.98                         |      |      |       | 0.93                         |      |      |       |
| HV %                                     |  | 0.0%                       | 1.1% | 0.0% | 2.4%  | 0.0%                            | 0.0% | 0.0% | 0.0%  | 0.0%                         | 0.0% | 1.6% | 0.4%  | 0.0%                         | 0.4% | 0.8% | 0.0%  |

| PM PEAK HOUR<br>4:45 PM<br>to<br>5:45 PM<br><br>PHF<br>HV % | Wells Avenue<br>Southbound |      |      |       | Winchester Street<br>Northbound |      |      |       | Nahanton Street<br>Eastbound |      |      |       | Nahanton Street<br>Westbound |      |      |       |
|-------------------------------------------------------------|----------------------------|------|------|-------|---------------------------------|------|------|-------|------------------------------|------|------|-------|------------------------------|------|------|-------|
|                                                             | U-Turn                     | Left | Thru | Right | U-Turn                          | Left | Thru | Right | U-Turn                       | Left | Thru | Right | U-Turn                       | Left | Thru | Right |
|                                                             | 0                          | 429  | 20   | 336   | 0                               | 116  | 2    | 55    | 0                            | 47   | 482  | 108   | 0                            | 138  | 542  | 59    |
|                                                             | 0.94                       |      |      |       | 0.98                            |      |      |       | 0.98                         |      |      |       | 0.97                         |      |      |       |
|                                                             | 0.0%                       | 0.2% | 0.0% | 0.3%  | 0.0%                            | 0.0% | 0.0% | 0.0%  | 0.0%                         | 0.0% | 0.4% | 0.9%  | 0.0%                         | 0.7% | 0.2% | 0.0%  |

11/6/2017, 8:42 AM, 12239.00\_127\_018\_TMC\_Loc 14

Client: Matt Duranleau  
Project #: 12239.00\_127\_018\_VHb  
BTD #: Location 14  
Location: Newton, MA  
Street 1: Nahant Street  
Street 2: Wells Avenue / Winchester Street  
Count Date: 10/26/2017  
Day of Week: Thursday  
Weather: Rainy, 55°F



#### TRUCKS

| Start Time | Wells Avenue Northbound |      |      |       | Winchester Street Southbound |      |      |       | Nahant Street Eastbound |      |      |       | Nahant Street Westbound |      |      |       |
|------------|-------------------------|------|------|-------|------------------------------|------|------|-------|-------------------------|------|------|-------|-------------------------|------|------|-------|
|            | U-Turn                  | Left | Thru | Right | U-Turn                       | Left | Thru | Right | U-Turn                  | Left | Thru | Right | U-Turn                  | Left | Thru | Right |
| 7:00 AM    | 0                       | 1    | 0    | 0     | 0                            | 0    | 0    | 0     | 0                       | 0    | 0    | 0     | 0                       | 0    | 0    | 0     |
| 7:15 AM    | 0                       | 0    | 0    | 0     | 0                            | 0    | 0    | 0     | 0                       | 0    | 1    | 0     | 0                       | 0    | 1    | 0     |
| 7:30 AM    | 0                       | 0    | 0    | 0     | 0                            | 1    | 0    | 0     | 0                       | 1    | 2    | 0     | 0                       | 1    | 0    | 0     |
| 7:45 AM    | 0                       | 1    | 0    | 1     | 0                            | 0    | 0    | 0     | 0                       | 0    | 1    | 0     | 0                       | 0    | 2    | 0     |
| 8:00 AM    | 0                       | 0    | 0    | 1     | 0                            | 0    | 0    | 0     | 0                       | 0    | 4    | 0     | 0                       | 0    | 1    | 0     |
| 8:15 AM    | 0                       | 0    | 0    | 0     | 0                            | 0    | 0    | 0     | 0                       | 0    | 2    | 1     | 0                       | 1    | 0    | 0     |
| 8:30 AM    | 0                       | 0    | 0    | 1     | 0                            | 0    | 0    | 0     | 0                       | 0    | 2    | 0     | 0                       | 0    | 1    | 0     |
| 8:45 AM    | 0                       | 0    | 0    | 0     | 0                            | 0    | 0    | 0     | 0                       | 0    | 1    | 0     | 0                       | 0    | 1    | 0     |

| Start Time | Wells Avenue Northbound |      |      |       | Winchester Street Southbound |      |      |       | Nahant Street Eastbound |      |      |       | Nahant Street Westbound |      |      |       |
|------------|-------------------------|------|------|-------|------------------------------|------|------|-------|-------------------------|------|------|-------|-------------------------|------|------|-------|
|            | U-Turn                  | Left | Thru | Right | U-Turn                       | Left | Thru | Right | U-Turn                  | Left | Thru | Right | U-Turn                  | Left | Thru | Right |
| 4:00 PM    | 0                       | 0    | 0    | 1     | 0                            | 0    | 0    | 0     | 0                       | 0    | 0    | 0     | 0                       | 0    | 1    | 0     |
| 4:15 PM    | 0                       | 0    | 0    | 0     | 0                            | 0    | 0    | 0     | 0                       | 0    | 0    | 0     | 0                       | 0    | 1    | 0     |
| 4:30 PM    | 0                       | 0    | 0    | 0     | 0                            | 0    | 0    | 0     | 0                       | 1    | 0    | 0     | 0                       | 0    | 0    | 0     |
| 4:45 PM    | 0                       | 1    | 0    | 0     | 0                            | 0    | 0    | 0     | 0                       | 0    | 0    | 0     | 0                       | 0    | 0    | 0     |
| 5:00 PM    | 0                       | 0    | 0    | 0     | 0                            | 0    | 0    | 0     | 0                       | 0    | 1    | 1     | 0                       | 0    | 0    | 0     |
| 5:15 PM    | 0                       | 0    | 0    | 1     | 0                            | 0    | 0    | 0     | 0                       | 0    | 1    | 0     | 0                       | 1    | 1    | 0     |
| 5:30 PM    | 0                       | 0    | 0    | 0     | 0                            | 0    | 0    | 0     | 0                       | 0    | 0    | 0     | 0                       | 0    | 0    | 0     |
| 5:45 PM    | 0                       | 0    | 0    | 0     | 0                            | 0    | 0    | 0     | 0                       | 0    | 0    | 0     | 0                       | 0    | 0    | 0     |

| AM PEAK HOUR<br>7:30 AM<br>to<br>8:30 AM<br><br>PHF | Wells Avenue<br>Northbound |      |      |       | Winchester Street<br>Southbound |      |      |       | Nahant Street<br>Eastbound |      |      |       | Nahant Street<br>Westbound |      |      |       |
|-----------------------------------------------------|----------------------------|------|------|-------|---------------------------------|------|------|-------|----------------------------|------|------|-------|----------------------------|------|------|-------|
|                                                     | U-Turn                     | Left | Thru | Right | U-Turn                          | Left | Thru | Right | U-Turn                     | Left | Thru | Right | U-Turn                     | Left | Thru | Right |
|                                                     | 0                          | 1    | 0    | 2     | 0                               | 1    | 0    | 0     | 0                          | 1    | 9    | 1     | 0                          | 2    | 3    | 0     |
|                                                     | 0.38                       |      |      |       | 0.25                            |      |      |       | 0.69                       |      |      |       | 0.63                       |      |      |       |

| PM PEAK HOUR<br>4:30 PM<br>to<br>5:30 PM<br><br>PHF | Wells Avenue<br>Northbound |      |      |       | Winchester Street<br>Southbound |      |      |       | Nahanton Street<br>Eastbound |      |      |       | Nahanton Street<br>Westbound |      |      |       |
|-----------------------------------------------------|----------------------------|------|------|-------|---------------------------------|------|------|-------|------------------------------|------|------|-------|------------------------------|------|------|-------|
|                                                     | U-Turn                     | Left | Thru | Right | U-Turn                          | Left | Thru | Right | U-Turn                       | Left | Thru | Right | U-Turn                       | Left | Thru | Right |
|                                                     | 0                          | 1    | 0    | 1     | 0                               | 0    | 0    | 0     | 0                            | 0    | 3    | 1     | 0                            | 1    | 1    | 0     |
|                                                     | 0.50                       |      |      |       | 0.00                            |      |      |       | 0.50                         |      |      |       | 0.25                         |      |      |       |

Client: Matt Duranleau  
Project #: 12239.00\_127\_018\_VHb  
BTD #: Location 14  
Location: Newton, MA  
Street 1: Nahant Street  
Street 2: Wells Avenue / Winchester Street  
Count Date: 10/26/2017  
Day of Week: Thursday  
Weather: Rainy, 55°F



#### PEDESTRIANS & BICYCLES

| Start Time | Wells Avenue Northbound |      |       |     | Winchester Street Southbound |      |       |     | Nahant Street Eastbound |      |       |     | Nahant Street Westbound |      |       |     |
|------------|-------------------------|------|-------|-----|------------------------------|------|-------|-----|-------------------------|------|-------|-----|-------------------------|------|-------|-----|
|            | Left                    | Thru | Right | PED | Left                         | Thru | Right | PED | Left                    | Thru | Right | PED | Left                    | Thru | Right | PED |
| 7:00 AM    | 0                       | 0    | 0     | 0   | 0                            | 0    | 0     | 0   | 0                       | 0    | 0     | 0   | 0                       | 0    | 0     | 0   |
| 7:15 AM    | 0                       | 0    | 0     | 0   | 0                            | 0    | 0     | 0   | 0                       | 0    | 0     | 0   | 0                       | 0    | 0     | 0   |
| 7:30 AM    | 0                       | 0    | 0     | 0   | 0                            | 0    | 0     | 0   | 0                       | 0    | 0     | 0   | 0                       | 0    | 0     | 0   |
| 7:45 AM    | 0                       | 0    | 0     | 0   | 0                            | 0    | 0     | 1   | 0                       | 0    | 0     | 0   | 0                       | 0    | 0     | 0   |
| 8:00 AM    | 0                       | 0    | 0     | 0   | 0                            | 0    | 0     | 0   | 0                       | 0    | 0     | 0   | 0                       | 0    | 0     | 1   |
| 8:15 AM    | 0                       | 0    | 0     | 0   | 0                            | 0    | 0     | 0   | 0                       | 0    | 0     | 0   | 0                       | 0    | 0     | 0   |
| 8:30 AM    | 0                       | 0    | 0     | 0   | 0                            | 0    | 0     | 0   | 0                       | 0    | 0     | 0   | 0                       | 0    | 0     | 0   |
| 8:45 AM    | 0                       | 0    | 0     | 0   | 0                            | 0    | 0     | 0   | 0                       | 0    | 0     | 0   | 0                       | 0    | 0     | 0   |

| Start Time | Wells Avenue Northbound |      |       |     | Winchester Street Southbound |      |       |     | Nahant Street Eastbound |      |       |     | Nahant Street Westbound |      |       |     |
|------------|-------------------------|------|-------|-----|------------------------------|------|-------|-----|-------------------------|------|-------|-----|-------------------------|------|-------|-----|
|            | Left                    | Thru | Right | PED | Left                         | Thru | Right | PED | Left                    | Thru | Right | PED | Left                    | Thru | Right | PED |
| 4:00 PM    | 0                       | 0    | 0     | 0   | 0                            | 0    | 0     | 0   | 0                       | 0    | 0     | 0   | 0                       | 0    | 0     | 0   |
| 4:15 PM    | 0                       | 0    | 0     | 0   | 0                            | 0    | 0     | 0   | 0                       | 0    | 0     | 0   | 0                       | 0    | 0     | 0   |
| 4:30 PM    | 0                       | 0    | 0     | 0   | 0                            | 0    | 0     | 0   | 0                       | 0    | 0     | 0   | 0                       | 0    | 0     | 0   |
| 4:45 PM    | 0                       | 0    | 0     | 0   | 0                            | 0    | 0     | 0   | 0                       | 0    | 0     | 0   | 0                       | 0    | 0     | 0   |
| 5:00 PM    | 0                       | 0    | 0     | 0   | 0                            | 0    | 0     | 1   | 0                       | 0    | 0     | 0   | 0                       | 0    | 0     | 0   |
| 5:15 PM    | 0                       | 0    | 0     | 0   | 0                            | 0    | 0     | 0   | 0                       | 0    | 0     | 0   | 0                       | 0    | 0     | 0   |
| 5:30 PM    | 0                       | 0    | 0     | 0   | 0                            | 0    | 0     | 0   | 0                       | 0    | 0     | 0   | 0                       | 0    | 0     | 0   |
| 5:45 PM    | 0                       | 0    | 0     | 0   | 0                            | 0    | 0     | 0   | 0                       | 0    | 0     | 0   | 0                       | 0    | 0     | 0   |

| AM PEAK HOUR       |  | Wells Avenue Northbound |      |       |     | Winchester Street Southbound |      |       |     | Nahant Street Eastbound |      |       |     | Nahant Street Westbound |      |       |     |
|--------------------|--|-------------------------|------|-------|-----|------------------------------|------|-------|-----|-------------------------|------|-------|-----|-------------------------|------|-------|-----|
| 7:45 AM to 8:45 AM |  | Left                    | Thru | Right | PED | Left                         | Thru | Right | PED | Left                    | Thru | Right | PED | Left                    | Thru | Right | PED |
|                    |  | 0                       | 0    | 0     | 0   | 0                            | 0    | 0     | 1   | 0                       | 0    | 0     | 0   | 0                       | 0    | 0     | 1   |

| PM PEAK HOUR       |  | Wells Avenue Northbound |      |       |     | Winchester Street Southbound |      |       |     | Nahant Street Eastbound |      |       |     | Nahant Street Westbound |      |       |     |
|--------------------|--|-------------------------|------|-------|-----|------------------------------|------|-------|-----|-------------------------|------|-------|-----|-------------------------|------|-------|-----|
| 4:45 PM to 5:45 PM |  | Left                    | Thru | Right | PED | Left                         | Thru | Right | PED | Left                    | Thru | Right | PED | Left                    | Thru | Right | PED |
|                    |  | 0                       | 0    | 0     | 0   | 0                            | 0    | 0     | 1   | 0                       | 0    | 0     | 0   | 0                       | 0    | 0     | 0   |

\*Peak hour corresponds to vehicular peak hours.

Client: Matt Duranleau  
Project #: 12239.00\_127\_018\_VHb  
BTD #: Location 15  
Location: Newton, MA  
Street 1: Nahanton Street  
Street 2: Winchester Street  
Count Date: 10/26/2017  
Day of Week: Thursday  
Weather: Rainy, 55°F



**TOTAL (CARS & TRUCKS)**

| Start Time | Northbound |      |      |       | Winchester Street Southbound |      |      |       | Nahanton Street Eastbound |      |      |       | Nahanton Street Westbound |      |      |       |
|------------|------------|------|------|-------|------------------------------|------|------|-------|---------------------------|------|------|-------|---------------------------|------|------|-------|
|            | U-Turn     | Left | Thru | Right | U-Turn                       | Left | Thru | Right | U-Turn                    | Left | Thru | Right | U-Turn                    | Left | Thru | Right |
| 7:00 AM    | 0          | 0    | 0    | 0     | 0                            | 1    | 0    | 22    | 0                         | 96   | 81   | 0     | 0                         | 0    | 84   | 3     |
| 7:15 AM    | 0          | 0    | 0    | 0     | 0                            | 3    | 0    | 35    | 0                         | 92   | 99   | 0     | 0                         | 0    | 108  | 4     |
| 7:30 AM    | 0          | 0    | 0    | 0     | 0                            | 4    | 0    | 46    | 0                         | 84   | 112  | 0     | 0                         | 0    | 127  | 4     |
| 7:45 AM    | 0          | 0    | 0    | 0     | 0                            | 6    | 0    | 61    | 0                         | 75   | 119  | 0     | 0                         | 0    | 148  | 5     |
| 8:00 AM    | 0          | 0    | 0    | 0     | 0                            | 7    | 0    | 73    | 0                         | 63   | 133  | 0     | 0                         | 0    | 165  | 3     |
| 8:15 AM    | 0          | 0    | 0    | 0     | 0                            | 6    | 0    | 70    | 0                         | 62   | 123  | 0     | 0                         | 0    | 160  | 4     |
| 8:30 AM    | 0          | 0    | 0    | 0     | 0                            | 5    | 0    | 64    | 0                         | 59   | 122  | 0     | 0                         | 0    | 149  | 2     |
| 8:45 AM    | 0          | 0    | 0    | 0     | 0                            | 4    | 0    | 61    | 0                         | 56   | 116  | 0     | 0                         | 0    | 139  | 2     |

| Start Time | Northbound |      |      |       | Winchester Street Southbound |      |      |       | Nahanton Street Eastbound |      |      |       | Nahanton Street Westbound |      |      |       |
|------------|------------|------|------|-------|------------------------------|------|------|-------|---------------------------|------|------|-------|---------------------------|------|------|-------|
|            | U-Turn     | Left | Thru | Right | U-Turn                       | Left | Thru | Right | U-Turn                    | Left | Thru | Right | U-Turn                    | Left | Thru | Right |
| 4:00 PM    | 0          | 0    | 0    | 0     | 0                            | 9    | 0    | 87    | 0                         | 64   | 101  | 0     | 0                         | 0    | 99   | 8     |
| 4:15 PM    | 0          | 0    | 0    | 0     | 0                            | 11   | 0    | 86    | 0                         | 71   | 107  | 0     | 0                         | 0    | 96   | 7     |
| 4:30 PM    | 0          | 0    | 0    | 0     | 0                            | 10   | 0    | 82    | 0                         | 75   | 121  | 0     | 0                         | 0    | 101  | 5     |
| 4:45 PM    | 0          | 0    | 0    | 0     | 0                            | 11   | 0    | 81    | 0                         | 84   | 136  | 0     | 0                         | 0    | 109  | 6     |
| 5:00 PM    | 0          | 0    | 0    | 0     | 0                            | 12   | 0    | 76    | 0                         | 89   | 152  | 0     | 0                         | 0    | 111  | 4     |
| 5:15 PM    | 0          | 0    | 0    | 0     | 0                            | 12   | 0    | 77    | 0                         | 87   | 155  | 0     | 0                         | 0    | 108  | 5     |
| 5:30 PM    | 0          | 0    | 0    | 0     | 0                            | 11   | 0    | 73    | 0                         | 82   | 149  | 0     | 0                         | 0    | 104  | 4     |
| 5:45 PM    | 0          | 0    | 0    | 0     | 0                            | 10   | 0    | 71    | 0                         | 79   | 144  | 0     | 0                         | 0    | 96   | 3     |

| AM PEAK HOUR<br>7:45 AM<br>to<br>8:45 AM |  | Northbound |      |      |       | Winchester Street<br>Southbound |      |      |       | Nahanton Street<br>Eastbound |      |      |       | Nahanton Street<br>Westbound |      |      |       |
|------------------------------------------|--|------------|------|------|-------|---------------------------------|------|------|-------|------------------------------|------|------|-------|------------------------------|------|------|-------|
|                                          |  | U-Turn     | Left | Thru | Right | U-Turn                          | Left | Thru | Right | U-Turn                       | Left | Thru | Right | U-Turn                       | Left | Thru | Right |
|                                          |  | 0          | 0    | 0    | 0     | 0                               | 24   | 0    | 268   | 0                            | 259  | 497  | 0     | 0                            | 0    | 622  | 14    |
| PHF                                      |  | 0.00       |      |      |       | 0.91                            |      |      |       | 0.96                         |      |      |       | 0.95                         |      |      |       |
| HV %                                     |  | 0.0%       | 0.0% | 0.0% | 0.0%  | 8.3%                            | 0.0% | 0.4% | 0.0%  | 0.0%                         | 0.8% | 2.0% | 0.0%  | 0.0%                         | 0.0% | 0.6% | 7.1%  |

| PM PEAK HOUR<br>4:45 PM<br>to<br>5:45 PM<br><br>PHF<br>HV % | Northbound |      |      |       | Winchester Street<br>Southbound |      |      |       | Nahanton Street<br>Eastbound |      |      |       | Nahanton Street<br>Westbound |      |      |       |
|-------------------------------------------------------------|------------|------|------|-------|---------------------------------|------|------|-------|------------------------------|------|------|-------|------------------------------|------|------|-------|
|                                                             | U-Turn     | Left | Thru | Right | U-Turn                          | Left | Thru | Right | U-Turn                       | Left | Thru | Right | U-Turn                       | Left | Thru | Right |
|                                                             | 0          | 0    | 0    | 0     | 0                               | 46   | 0    | 307   | 0                            | 342  | 592  | 0     | 0                            | 0    | 432  | 19    |
|                                                             | 0.00       |      |      |       | 0.96                            |      |      |       | 0.96                         |      |      |       | 0.98                         |      |      |       |
|                                                             | 0.0%       | 0.0% | 0.0% | 0.0%  | 0.0%                            | 2.2% | 0.0% | 0.0%  | 0.0%                         | 0.3% | 0.3% | 0.0%  | 0.0%                         | 0.0% | 0.5% | 0.0%  |

11/6/2017, 8:45 AM, 12239.00\_127\_018\_TMC\_Loc 15

Client: Matt Duranleau  
Project #: 12239.00\_127\_018\_VHb  
BTD #: Location 15  
Location: Newton, MA  
Street 1: Nahanton Street  
Street 2: Winchester Street  
Count Date: 10/26/2017  
Day of Week: Thursday  
Weather: Rainy, 55°F



**TRUCKS**

| Start Time | Northbound |      |      |       | Winchester Street Southbound |      |      |       | Nahanton Street Eastbound |      |      |       | Nahanton Street Westbound |      |      |       |
|------------|------------|------|------|-------|------------------------------|------|------|-------|---------------------------|------|------|-------|---------------------------|------|------|-------|
|            | U-Turn     | Left | Thru | Right | U-Turn                       | Left | Thru | Right | U-Turn                    | Left | Thru | Right | U-Turn                    | Left | Thru | Right |
| 7:00 AM    | 0          | 0    | 0    | 0     | 0                            | 0    | 0    | 0     | 0                         | 0    | 0    | 0     | 0                         | 0    | 0    | 0     |
| 7:15 AM    | 0          | 0    | 0    | 0     | 0                            | 0    | 0    | 0     | 0                         | 0    | 1    | 0     | 0                         | 0    | 1    | 0     |
| 7:30 AM    | 0          | 0    | 0    | 0     | 0                            | 0    | 0    | 0     | 0                         | 1    | 2    | 0     | 0                         | 0    | 1    | 0     |
| 7:45 AM    | 0          | 0    | 0    | 0     | 0                            | 1    | 0    | 0     | 0                         | 0    | 2    | 0     | 0                         | 0    | 2    | 0     |
| 8:00 AM    | 0          | 0    | 0    | 0     | 0                            | 0    | 0    | 0     | 0                         | 1    | 4    | 0     | 0                         | 0    | 1    | 0     |
| 8:15 AM    | 0          | 0    | 0    | 0     | 0                            | 0    | 0    | 1     | 0                         | 0    | 2    | 0     | 0                         | 0    | 0    | 1     |
| 8:30 AM    | 0          | 0    | 0    | 0     | 0                            | 1    | 0    | 0     | 0                         | 1    | 2    | 0     | 0                         | 0    | 1    | 0     |
| 8:45 AM    | 0          | 0    | 0    | 0     | 0                            | 0    | 0    | 0     | 0                         | 1    | 0    | 0     | 0                         | 0    | 1    | 0     |

| Start Time | Northbound |      |      |       | Winchester Street Southbound |      |      |       | Nahanton Street Eastbound |      |      |       | Nahanton Street Westbound |      |      |       |
|------------|------------|------|------|-------|------------------------------|------|------|-------|---------------------------|------|------|-------|---------------------------|------|------|-------|
|            | U-Turn     | Left | Thru | Right | U-Turn                       | Left | Thru | Right | U-Turn                    | Left | Thru | Right | U-Turn                    | Left | Thru | Right |
| 4:00 PM    | 0          | 0    | 0    | 0     | 0                            | 0    | 0    | 0     | 0                         | 0    | 1    | 0     | 0                         | 0    | 1    | 0     |
| 4:15 PM    | 0          | 0    | 0    | 0     | 0                            | 0    | 0    | 0     | 0                         | 0    | 0    | 0     | 0                         | 0    | 0    | 1     |
| 4:30 PM    | 0          | 0    | 0    | 0     | 0                            | 0    | 0    | 0     | 0                         | 0    | 1    | 0     | 0                         | 0    | 0    | 0     |
| 4:45 PM    | 0          | 0    | 0    | 0     | 0                            | 0    | 0    | 0     | 0                         | 0    | 0    | 0     | 0                         | 0    | 0    | 1     |
| 5:00 PM    | 0          | 0    | 0    | 0     | 0                            | 1    | 0    | 0     | 0                         | 0    | 1    | 0     | 0                         | 0    | 0    | 0     |
| 5:15 PM    | 0          | 0    | 0    | 0     | 0                            | 0    | 0    | 0     | 0                         | 1    | 1    | 0     | 0                         | 0    | 2    | 0     |
| 5:30 PM    | 0          | 0    | 0    | 0     | 0                            | 0    | 0    | 0     | 0                         | 0    | 0    | 0     | 0                         | 0    | 0    | 0     |
| 5:45 PM    | 0          | 0    | 0    | 0     | 0                            | 0    | 0    | 0     | 0                         | 0    | 0    | 0     | 0                         | 0    | 0    | 0     |

| AM PEAK HOUR<br>7:45 AM<br>to<br>8:45 AM<br><br>PHF | Northbound |      |      |       | Winchester Street<br>Southbound |      |      |       | Nahanton Street<br>Eastbound |      |      |       | Nahanton Street<br>Westbound |      |      |       |
|-----------------------------------------------------|------------|------|------|-------|---------------------------------|------|------|-------|------------------------------|------|------|-------|------------------------------|------|------|-------|
|                                                     | U-Turn     | Left | Thru | Right | U-Turn                          | Left | Thru | Right | U-Turn                       | Left | Thru | Right | U-Turn                       | Left | Thru | Right |
|                                                     | 0          | 0    | 0    | 0     | 0                               | 2    | 0    | 1     | 0                            | 2    | 10   | 0     | 0                            | 0    | 4    | 1     |
|                                                     | 0.00       |      |      |       | 0.75                            |      |      |       | 0.60                         |      |      |       | 0.63                         |      |      |       |

| PM PEAK HOUR<br>4:30 PM<br>to<br>5:30 PM<br><br>PHF | Northbound |      |      |       | Winchester Street<br>Southbound |      |      |       | Nahanton Street<br>Eastbound |      |      |       | Nahanton Street<br>Westbound |      |      |       |
|-----------------------------------------------------|------------|------|------|-------|---------------------------------|------|------|-------|------------------------------|------|------|-------|------------------------------|------|------|-------|
|                                                     | U-Turn     | Left | Thru | Right | U-Turn                          | Left | Thru | Right | U-Turn                       | Left | Thru | Right | U-Turn                       | Left | Thru | Right |
|                                                     | 0          | 0    | 0    | 0     | 0                               | 1    | 0    | 0     | 0                            | 1    | 3    | 0     | 0                            | 0    | 2    | 0     |
|                                                     | 0.00       |      |      |       | 0.25                            |      |      |       | 0.50                         |      |      |       | 0.25                         |      |      |       |

11/6/2017, 8:45 AM, 12239.00\_127\_018\_TMC\_Loc 15

Client: Matt Duranleau  
Project #: 12239.00\_127\_018\_VHb  
BTD #: Location 15  
Location: Newton, MA  
Street 1: Nahantown Street  
Street 2: Winchester Street  
Count Date: 10/26/2017  
Day of Week: Thursday  
Weather: Rainy, 55°F



PEDESTRIANS & BICYCLES

| Northbound |      |      |       |       | Winchester Street |      |       |       | Nahantown Street |      |       |       | Nahantown Street |      |       |       |
|------------|------|------|-------|-------|-------------------|------|-------|-------|------------------|------|-------|-------|------------------|------|-------|-------|
|            | Left |      | Thru  | Right | Left              |      | Thru  | Right | Left             |      | Thru  | Right | Left             |      | Thru  | Right |
| Start Time | Left | Thru | Right | PED   | Left              | Thru | Right | PED   | Left             | Thru | Right | PED   | Left             | Thru | Right | PED   |
| 7:00 AM    | 0    | 0    | 0     | 0     | 0                 | 0    | 0     | 0     | 0                | 0    | 0     | 0     | 0                | 0    | 0     | 0     |
| 7:15 AM    | 0    | 0    | 0     | 0     | 0                 | 0    | 0     | 0     | 0                | 0    | 0     | 0     | 0                | 0    | 0     | 0     |
| 7:30 AM    | 0    | 0    | 0     | 0     | 0                 | 0    | 0     | 0     | 0                | 0    | 0     | 0     | 0                | 0    | 0     | 0     |
| 7:45 AM    | 0    | 0    | 0     | 0     | 0                 | 0    | 0     | 0     | 0                | 0    | 0     | 0     | 0                | 0    | 0     | 0     |
| 8:00 AM    | 0    | 0    | 0     | 0     | 0                 | 0    | 0     | 0     | 0                | 0    | 0     | 0     | 0                | 0    | 0     | 0     |
| 8:15 AM    | 0    | 0    | 0     | 0     | 0                 | 0    | 0     | 0     | 0                | 0    | 0     | 0     | 0                | 0    | 0     | 0     |
| 8:30 AM    | 0    | 0    | 0     | 0     | 0                 | 0    | 0     | 0     | 0                | 0    | 0     | 0     | 0                | 0    | 0     | 0     |
| 8:45 AM    | 0    | 0    | 0     | 0     | 0                 | 0    | 0     | 0     | 0                | 0    | 0     | 0     | 0                | 0    | 0     | 0     |

| Northbound |      |      |       |     | Winchester Street Southbound |      |       |     |      | Nahantown Street Eastbound |       |     |      |      | Nahantown Street Westbound |     |  |  |  |
|------------|------|------|-------|-----|------------------------------|------|-------|-----|------|----------------------------|-------|-----|------|------|----------------------------|-----|--|--|--|
| Start Time | Left | Thru | Right | PED | Left                         | Thru | Right | PED | Left | Thru                       | Right | PED | Left | Thru | Right                      | PED |  |  |  |
| 4:00 PM    | 0    | 0    | 0     | 0   | 0                            | 0    | 0     | 0   | 0    | 0                          | 0     | 0   | 0    | 0    | 0                          | 0   |  |  |  |
| 4:15 PM    | 0    | 0    | 0     | 0   | 0                            | 0    | 0     | 0   | 0    | 0                          | 0     | 0   | 0    | 0    | 0                          | 0   |  |  |  |
| 4:30 PM    | 0    | 0    | 0     | 0   | 0                            | 0    | 0     | 0   | 0    | 0                          | 0     | 0   | 0    | 0    | 0                          | 0   |  |  |  |
| 4:45 PM    | 0    | 0    | 0     | 0   | 0                            | 0    | 0     | 0   | 0    | 0                          | 0     | 0   | 0    | 0    | 0                          | 0   |  |  |  |
| 5:00 PM    | 0    | 0    | 0     | 0   | 0                            | 0    | 0     | 0   | 0    | 0                          | 0     | 0   | 0    | 0    | 0                          | 0   |  |  |  |
| 5:15 PM    | 0    | 0    | 0     | 0   | 0                            | 0    | 0     | 0   | 0    | 0                          | 0     | 0   | 0    | 0    | 0                          | 0   |  |  |  |
| 5:30 PM    | 0    | 0    | 0     | 0   | 0                            | 0    | 0     | 0   | 0    | 0                          | 0     | 0   | 0    | 0    | 0                          | 0   |  |  |  |
| 5:45 PM    | 0    | 0    | 0     | 0   | 0                            | 0    | 0     | 0   | 0    | 0                          | 0     | 0   | 0    | 0    | 0                          | 0   |  |  |  |

| Northbound                               |  |      |      |       | Winchester Street Southbound |      |      |       |     | Nahantown Street Eastbound |      |       |     |      | Nahantown Street Westbound |       |     |   |  |
|------------------------------------------|--|------|------|-------|------------------------------|------|------|-------|-----|----------------------------|------|-------|-----|------|----------------------------|-------|-----|---|--|
| AM PEAK HOUR<br>7:45 AM<br>to<br>8:45 AM |  | Left | Thru | Right | PED                          | Left | Thru | Right | PED | Left                       | Thru | Right | PED | Left | Thru                       | Right | PED |   |  |
|                                          |  | 0    | 0    | 0     | 0                            | 0    | 0    | 0     | 0   | 0                          | 0    | 0     | 0   | 0    | 0                          | 0     | 0   | 0 |  |

| Northbound |      |      |       |     | Winchester Street Southbound |      |      |       |     | Nahantown Street Eastbound |      |      |       |     | Nahantown Street Westbound |      |      |       |     |
|------------|------|------|-------|-----|------------------------------|------|------|-------|-----|----------------------------|------|------|-------|-----|----------------------------|------|------|-------|-----|
| 4:45 PM    | Left | Thru | Right | PED |                              | Left | Thru | Right | PED |                            | Left | Thru | Right | PED |                            | Left | Thru | Right | PED |
| to         | 0    | 0    | 0     | 0   |                              | 0    | 0    | 0     | 0   |                            | 0    | 0    | 0     | 0   |                            | 0    | 0    | 0     | 0   |
| 5:45 PM    | 0    | 0    | 0     | 0   |                              | 0    | 0    | 0     | 0   |                            | 0    | 0    | 0     | 0   |                            | 0    | 0    | 0     | 0   |

\*Peak hours corresponds to vehicular peak hours.

11/6/2017, 8:45 AM, 12239.00\_127\_018\_TMC\_Loc 15

Client: Matt Duranleau  
Project #: 12239.00\_127\_018\_VHb  
BTD #: Location 16  
Location: Needham, MA  
Street 1: Highland Avenue  
Street 2: Riverside Street  
Count Date: 10/26/2017  
Day of Week: Thursday  
Weather: Rainy, 55°F



TOTAL (CARS & TRUCKS)

| Highland Avenue<br>Northeastbound |        |      |      |       | Highland Avenue<br>Southwestbound |      |      |       |        | Riverside Street<br>Northwestbound |      |       |        |      | Southeastbound |       |  |  |  |
|-----------------------------------|--------|------|------|-------|-----------------------------------|------|------|-------|--------|------------------------------------|------|-------|--------|------|----------------|-------|--|--|--|
| Start Time                        | U-Turn | Left | Thru | Right | U-Turn                            | Left | Thru | Right | U-Turn | Left                               | Thru | Right | U-Turn | Left | Thru           | Right |  |  |  |
| 7:00 AM                           | 0      | 0    | 148  | 0     | 0                                 | 0    | 131  | 0     | 0      | 1                                  | 0    | 0     | 0      | 0    | 0              | 0     |  |  |  |
| 7:15 AM                           | 0      | 0    | 166  | 0     | 0                                 | 0    | 137  | 0     | 0      | 0                                  | 0    | 0     | 0      | 0    | 0              | 0     |  |  |  |
| 7:30 AM                           | 0      | 0    | 177  | 0     | 0                                 | 0    | 155  | 0     | 0      | 0                                  | 0    | 0     | 0      | 0    | 0              | 0     |  |  |  |
| 7:45 AM                           | 0      | 0    | 198  | 1     | 0                                 | 1    | 167  | 0     | 0      | 1                                  | 0    | 1     | 0      | 0    | 0              | 0     |  |  |  |
| 8:00 AM                           | 0      | 0    | 215  | 0     | 0                                 | 0    | 196  | 0     | 0      | 2                                  | 0    | 1     | 0      | 0    | 0              | 0     |  |  |  |
| 8:15 AM                           | 0      | 0    | 211  | 1     | 0                                 | 0    | 191  | 0     | 0      | 4                                  | 0    | 0     | 0      | 0    | 0              | 0     |  |  |  |
| 8:30 AM                           | 0      | 0    | 197  | 1     | 0                                 | 0    | 192  | 0     | 0      | 4                                  | 0    | 0     | 0      | 0    | 0              | 0     |  |  |  |
| 8:45 AM                           | 0      | 0    | 192  | 2     | 0                                 | 1    | 189  | 0     | 0      | 1                                  | 0    | 0     | 0      | 0    | 0              | 0     |  |  |  |

| Highland Avenue<br>Northeastbound |        |      |      |       | Highland Avenue<br>Southwestbound |      |      |       |        | Riverside Street<br>Northwestbound |      |       |        |      | Southeastbound |       |  |  |  |
|-----------------------------------|--------|------|------|-------|-----------------------------------|------|------|-------|--------|------------------------------------|------|-------|--------|------|----------------|-------|--|--|--|
| Start Time                        | U-Turn | Left | Thru | Right | U-Turn                            | Left | Thru | Right | U-Turn | Left                               | Thru | Right | U-Turn | Left | Thru           | Right |  |  |  |
| 4:00 PM                           | 0      | 0    | 164  | 1     | 0                                 | 4    | 232  | 0     | 0      | 1                                  | 0    | 0     | 0      | 0    | 0              | 0     |  |  |  |
| 4:15 PM                           | 0      | 0    | 169  | 2     | 0                                 | 2    | 240  | 0     | 0      | 1                                  | 0    | 0     | 0      | 0    | 0              | 0     |  |  |  |
| 4:30 PM                           | 0      | 0    | 164  | 2     | 0                                 | 0    | 232  | 0     | 0      | 3                                  | 0    | 0     | 0      | 0    | 0              | 0     |  |  |  |
| 4:45 PM                           | 0      | 0    | 173  | 3     | 0                                 | 0    | 224  | 0     | 0      | 3                                  | 0    | 1     | 0      | 0    | 0              | 0     |  |  |  |
| 5:00 PM                           | 0      | 0    | 180  | 1     | 0                                 | 0    | 218  | 0     | 0      | 0                                  | 0    | 2     | 0      | 0    | 0              | 0     |  |  |  |
| 5:15 PM                           | 0      | 0    | 176  | 1     | 0                                 | 1    | 197  | 0     | 0      | 0                                  | 0    | 0     | 0      | 0    | 0              | 0     |  |  |  |
| 5:30 PM                           | 0      | 0    | 174  | 0     | 0                                 | 0    | 200  | 0     | 0      | 0                                  | 0    | 1     | 0      | 0    | 0              | 0     |  |  |  |
| 5:45 PM                           | 0      | 0    | 169  | 1     | 0                                 | 0    | 192  | 0     | 0      | 1                                  | 0    | 1     | 0      | 0    | 0              | 0     |  |  |  |

| Highland Avenue Northeastbound |      |      |       | Highland Avenue Southwestbound |      |      |       | Riverside Street Northwestbound |      |      |       | Southeastbound |      |      |       |
|--------------------------------|------|------|-------|--------------------------------|------|------|-------|---------------------------------|------|------|-------|----------------|------|------|-------|
| U-Turn                         | Left | Thru | Right | U-Turn                         | Left | Thru | Right | U-Turn                          | Left | Thru | Right | U-Turn         | Left | Thru | Right |
| 0                              | 0    | 815  | 4     | 0                              | 1    | 768  | 0     | 0                               | 11   | 0    | 1     | 0              | 0    | 0    | 0     |
| PHF                            |      |      |       | 0.95                           |      |      |       | 0.98                            |      |      |       | 0.75           |      |      |       |
| HV %                           |      |      |       | 0.0%                           |      |      |       | 0.0%                            |      |      |       | 0.0%           |      |      |       |

| Highland Avenue Northeastbound |      |      |       | Highland Avenue Southwestbound |      |      |       | Riverside Street Northwestbound |      |      |       | Southeastbound |      |      |       |
|--------------------------------|------|------|-------|--------------------------------|------|------|-------|---------------------------------|------|------|-------|----------------|------|------|-------|
| U-Turn                         | Left | Thru | Right | U-Turn                         | Left | Thru | Right | U-Turn                          | Left | Thru | Right | U-Turn         | Left | Thru | Right |
| 0                              | 0    | 879  | 8     | 0                              | 6    | 928  | 0     | 0                               | 8    | 0    | 1     | 0              | 0    | 0    | 0     |
| PHF                            |      |      |       | 0.96                           |      |      |       | 0.96                            |      |      |       | 0.56           |      |      |       |
| HV %                           |      |      |       | 0.0%                           |      |      |       | 0.0%                            |      |      |       | 0.0%           |      |      |       |

11/6/2017, 8:48 AM, 12239.00\_127\_018\_TMC\_Loc 16



Client: Matt Duranleau  
Project #: 12239.00\_127\_018\_VHb  
BTD #: Location 16  
Location: Needham, MA  
Street 1: Highland Avenue  
Street 2: Riverside Street  
Count Date: 10/26/2017  
Day of Week: Thursday  
Weather: Rainy, 55°F



#### TRUCKS

| Start Time | Highland Avenue Northeastbound |      |      |       | Highland Avenue Southwestbound |      |      |       | Riverside Street Northwestbound |      |      |       | Southeastbound |      |      |       |
|------------|--------------------------------|------|------|-------|--------------------------------|------|------|-------|---------------------------------|------|------|-------|----------------|------|------|-------|
|            | U-Turn                         | Left | Thru | Right | U-Turn                         | Left | Thru | Right | U-Turn                          | Left | Thru | Right | U-Turn         | Left | Thru | Right |
| 7:00 AM    | 0                              | 0    | 2    | 0     | 0                              | 0    | 1    | 0     | 0                               | 0    | 0    | 0     | 0              | 0    | 0    | 0     |
| 7:15 AM    | 0                              | 0    | 3    | 0     | 0                              | 0    | 2    | 0     | 0                               | 0    | 0    | 0     | 0              | 0    | 0    | 0     |
| 7:30 AM    | 0                              | 0    | 2    | 0     | 0                              | 0    | 1    | 0     | 0                               | 0    | 0    | 0     | 0              | 0    | 0    | 0     |
| 7:45 AM    | 0                              | 0    | 1    | 0     | 0                              | 0    | 1    | 0     | 0                               | 0    | 0    | 0     | 0              | 0    | 0    | 0     |
| 8:00 AM    | 0                              | 0    | 2    | 0     | 0                              | 0    | 2    | 0     | 0                               | 0    | 0    | 0     | 0              | 0    | 0    | 0     |
| 8:15 AM    | 0                              | 0    | 3    | 0     | 0                              | 0    | 0    | 0     | 0                               | 0    | 0    | 0     | 0              | 0    | 0    | 0     |
| 8:30 AM    | 0                              | 0    | 1    | 0     | 0                              | 0    | 2    | 0     | 0                               | 0    | 0    | 0     | 0              | 0    | 0    | 0     |
| 8:45 AM    | 0                              | 0    | 2    | 0     | 0                              | 0    | 1    | 0     | 0                               | 0    | 0    | 0     | 0              | 0    | 0    | 0     |

| Start Time | Highland Avenue Northeastbound |      |      |       | Highland Avenue Southwestbound |      |      |       | Riverside Street Northwestbound |      |      |       | Southeastbound |      |      |       |
|------------|--------------------------------|------|------|-------|--------------------------------|------|------|-------|---------------------------------|------|------|-------|----------------|------|------|-------|
|            | U-Turn                         | Left | Thru | Right | U-Turn                         | Left | Thru | Right | U-Turn                          | Left | Thru | Right | U-Turn         | Left | Thru | Right |
| 4:00 PM    | 0                              | 0    | 2    | 0     | 0                              | 0    | 0    | 0     | 0                               | 0    | 0    | 0     | 0              | 0    | 0    | 0     |
| 4:15 PM    | 0                              | 0    | 0    | 0     | 0                              | 0    | 0    | 0     | 0                               | 0    | 0    | 0     | 0              | 0    | 0    | 0     |
| 4:30 PM    | 0                              | 0    | 0    | 0     | 0                              | 0    | 1    | 0     | 0                               | 0    | 0    | 0     | 0              | 0    | 0    | 0     |
| 4:45 PM    | 0                              | 0    | 1    | 0     | 0                              | 0    | 1    | 0     | 0                               | 0    | 0    | 0     | 0              | 0    | 0    | 0     |
| 5:00 PM    | 0                              | 0    | 0    | 0     | 0                              | 0    | 0    | 0     | 0                               | 0    | 0    | 0     | 0              | 0    | 0    | 0     |
| 5:15 PM    | 0                              | 0    | 1    | 0     | 0                              | 0    | 1    | 0     | 0                               | 0    | 0    | 0     | 0              | 0    | 0    | 0     |
| 5:30 PM    | 0                              | 0    | 0    | 0     | 0                              | 0    | 0    | 0     | 0                               | 0    | 0    | 0     | 0              | 0    | 0    | 0     |
| 5:45 PM    | 0                              | 0    | 0    | 0     | 0                              | 0    | 0    | 0     | 0                               | 0    | 0    | 0     | 0              | 0    | 0    | 0     |

| AM PEAK HOUR<br>7:15 AM<br>to<br>8:15 AM<br><i>PHF</i> | Highland Avenue Northeastbound |      |      |       | Highland Avenue Southwestbound |      |      |       | Riverside Street Northwestbound |      |      |       | Southeastbound |      |      |       |
|--------------------------------------------------------|--------------------------------|------|------|-------|--------------------------------|------|------|-------|---------------------------------|------|------|-------|----------------|------|------|-------|
|                                                        | U-Turn                         | Left | Thru | Right | U-Turn                         | Left | Thru | Right | U-Turn                          | Left | Thru | Right | U-Turn         | Left | Thru | Right |
|                                                        | 0                              | 0    | 8    | 0     | 0                              | 0    | 6    | 0     | 0                               | 0    | 0    | 0     | 0              | 0    | 0    | 0     |
|                                                        | 0.67                           |      |      |       | 0.75                           |      |      |       | 0.00                            |      |      |       | 0.00           |      |      |       |

| PM PEAK HOUR<br>4:00 PM<br>to<br>5:00 PM<br><i>PHF</i> | Highland Avenue Northeastbound |      |      |       | Highland Avenue Southwestbound |      |      |       | Riverside Street Northwestbound |      |      |       | Southeastbound |      |      |       |
|--------------------------------------------------------|--------------------------------|------|------|-------|--------------------------------|------|------|-------|---------------------------------|------|------|-------|----------------|------|------|-------|
|                                                        | U-Turn                         | Left | Thru | Right | U-Turn                         | Left | Thru | Right | U-Turn                          | Left | Thru | Right | U-Turn         | Left | Thru | Right |
|                                                        | 0                              | 0    | 3    | 0     | 0                              | 0    | 2    | 0     | 0                               | 0    | 0    | 0     | 0              | 0    | 0    | 0     |
|                                                        | 0.38                           |      |      |       | 0.50                           |      |      |       | 0.00                            |      |      |       | 0.00           |      |      |       |

Client: Matt Duranleau  
Project #: 12239.00\_127\_018\_VHb  
BTD #: Location 16  
Location: Needham, MA  
Street 1: Highland Avenue  
Street 2: Riverside Street  
Count Date: 10/26/2017  
Day of Week: Thursday  
Weather: Rainy, 55°F



#### PEDESTRIANS & BICYCLES

| Start Time | Highland Avenue Northeastbound |      |       |     | Highland Avenue Southwestbound |      |       |     | Riverside Street Northwestbound |      |       |     | Southeastbound |      |       |     |
|------------|--------------------------------|------|-------|-----|--------------------------------|------|-------|-----|---------------------------------|------|-------|-----|----------------|------|-------|-----|
|            | Left                           | Thru | Right | PED | Left                           | Thru | Right | PED | Left                            | Thru | Right | PED | Left           | Thru | Right | PED |
| 7:00 AM    | 0                              | 0    | 0     | 0   | 0                              | 0    | 0     | 0   | 0                               | 0    | 0     | 1   | 0              | 0    | 0     | 0   |
| 7:15 AM    | 0                              | 1    | 0     | 0   | 0                              | 0    | 0     | 0   | 0                               | 0    | 0     | 1   | 0              | 0    | 0     | 0   |
| 7:30 AM    | 0                              | 0    | 0     | 0   | 0                              | 0    | 0     | 0   | 0                               | 0    | 0     | 3   | 0              | 0    | 0     | 0   |
| 7:45 AM    | 0                              | 0    | 0     | 0   | 0                              | 0    | 0     | 0   | 0                               | 0    | 0     | 0   | 0              | 0    | 0     | 0   |
| 8:00 AM    | 0                              | 0    | 0     | 0   | 0                              | 1    | 0     | 1   | 0                               | 0    | 0     | 1   | 0              | 0    | 0     | 0   |
| 8:15 AM    | 0                              | 0    | 0     | 0   | 0                              | 0    | 0     | 0   | 0                               | 0    | 0     | 1   | 0              | 0    | 0     | 0   |
| 8:30 AM    | 0                              | 0    | 0     | 0   | 0                              | 0    | 0     | 0   | 0                               | 0    | 0     | 0   | 0              | 0    | 0     | 0   |
| 8:45 AM    | 0                              | 0    | 0     | 0   | 0                              | 0    | 0     | 0   | 0                               | 0    | 0     | 1   | 0              | 0    | 0     | 0   |

| Start Time | Highland Avenue Northeastbound |      |       |     | Highland Avenue Southwestbound |      |       |     | Riverside Street Northwestbound |      |       |     | Southeastbound |      |       |     |
|------------|--------------------------------|------|-------|-----|--------------------------------|------|-------|-----|---------------------------------|------|-------|-----|----------------|------|-------|-----|
|            | Left                           | Thru | Right | PED | Left                           | Thru | Right | PED | Left                            | Thru | Right | PED | Left           | Thru | Right | PED |
| 4:00 PM    | 0                              | 0    | 0     | 0   | 0                              | 1    | 0     | 0   | 0                               | 0    | 0     | 1   | 0              | 0    | 0     | 0   |
| 4:15 PM    | 0                              | 0    | 0     | 0   | 0                              | 0    | 0     | 0   | 0                               | 0    | 0     | 1   | 0              | 0    | 0     | 0   |
| 4:30 PM    | 0                              | 0    | 0     | 0   | 0                              | 0    | 0     | 0   | 0                               | 0    | 0     | 0   | 0              | 0    | 0     | 0   |
| 4:45 PM    | 0                              | 0    | 0     | 0   | 0                              | 0    | 0     | 0   | 0                               | 0    | 0     | 2   | 0              | 0    | 0     | 0   |
| 5:00 PM    | 0                              | 1    | 0     | 0   | 0                              | 0    | 0     | 0   | 0                               | 0    | 0     | 0   | 0              | 0    | 0     | 0   |
| 5:15 PM    | 0                              | 0    | 0     | 0   | 0                              | 0    | 0     | 0   | 0                               | 0    | 0     | 1   | 0              | 0    | 0     | 0   |
| 5:30 PM    | 0                              | 0    | 0     | 0   | 0                              | 0    | 0     | 0   | 0                               | 0    | 0     | 2   | 0              | 0    | 0     | 0   |
| 5:45 PM    | 0                              | 0    | 0     | 0   | 0                              | 0    | 0     | 0   | 0                               | 0    | 0     | 0   | 0              | 0    | 0     | 0   |

| AM PEAK HOUR<br>8:00 AM<br>to<br>9:00 AM | Highland Avenue Northeastbound |      |       |     | Highland Avenue Southwestbound |      |       |     | Riverside Street Northwestbound |      |       |     | Southeastbound |      |       |     |
|------------------------------------------|--------------------------------|------|-------|-----|--------------------------------|------|-------|-----|---------------------------------|------|-------|-----|----------------|------|-------|-----|
|                                          | Left                           | Thru | Right | PED | Left                           | Thru | Right | PED | Left                            | Thru | Right | PED | Left           | Thru | Right | PED |
|                                          | 0                              | 0    | 0     | 0   | 0                              | 1    | 0     | 1   | 0                               | 0    | 0     | 3   | 0              | 0    | 0     | 0   |

| PM PEAK HOUR<br>4:00 PM<br>to<br>5:00 PM | Highland Avenue Northeastbound |      |       |     | Highland Avenue Southwestbound |      |       |     | Riverside Street Northwestbound |      |       |     | Southeastbound |      |       |     |
|------------------------------------------|--------------------------------|------|-------|-----|--------------------------------|------|-------|-----|---------------------------------|------|-------|-----|----------------|------|-------|-----|
|                                          | Left                           | Thru | Right | PED | Left                           | Thru | Right | PED | Left                            | Thru | Right | PED | Left           | Thru | Right | PED |
|                                          | 0                              | 0    | 0     | 0   | 0                              | 1    | 0     | 0   | 0                               | 0    | 0     | 4   | 0              | 0    | 0     | 0   |

\*Peak hour corresponds to vehicular peak hours.

Client: Matt Duranleau  
Project #: 12239.00\_127\_018\_VHb  
BTD #: Location 17  
Location: Needham, MA  
Street 1: Highland Avenue  
Street 2: Highland Terrace / Highland Circle  
Count Date: 10/26/2017  
Day of Week: Thursday  
Weather: Rainy, 55°F



**TOTAL (CARS & TRUCKS)**

| Start Time | Highland Avenue Northeastbound |      |      | Highland Avenue Southwestbound |        |      | Highland Terrace Northwestbound |       |        | Highland Circle Southeastbound |      |       |
|------------|--------------------------------|------|------|--------------------------------|--------|------|---------------------------------|-------|--------|--------------------------------|------|-------|
|            | U-Turn                         | Left | Thru | Right                          | U-Turn | Left | Thru                            | Right | U-Turn | Left                           | Thru | Right |
| 7:00 AM    | 0                              | 5    | 148  | 1                              | 0      | 0    | 132                             | 0     | 0      | 0                              | 0    | 0     |
| 7:15 AM    | 0                              | 4    | 165  | 0                              | 0      | 1    | 136                             | 0     | 0      | 1                              | 0    | 0     |
| 7:30 AM    | 0                              | 3    | 176  | 0                              | 0      | 1    | 155                             | 1     | 0      | 2                              | 0    | 2     |
| 7:45 AM    | 0                              | 2    | 197  | 1                              | 0      | 0    | 168                             | 0     | 0      | 2                              | 0    | 1     |
| 8:00 AM    | 0                              | 1    | 214  | 1                              | 0      | 0    | 197                             | 1     | 0      | 3                              | 0    | 2     |
| 8:15 AM    | 0                              | 1    | 209  | 2                              | 0      | 1    | 193                             | 1     | 0      | 1                              | 0    | 0     |
| 8:30 AM    | 0                              | 2    | 196  | 1                              | 0      | 1    | 195                             | 0     | 0      | 1                              | 0    | 0     |
| 8:45 AM    | 0                              | 1    | 193  | 1                              | 0      | 0    | 189                             | 1     | 0      | 2                              | 0    | 1     |

| Start Time | Highland Avenue Northeastbound |      |      | Highland Avenue Southwestbound |        |      | Highland Terrace Northwestbound |       |        | Highland Circle Southeastbound |      |       |
|------------|--------------------------------|------|------|--------------------------------|--------|------|---------------------------------|-------|--------|--------------------------------|------|-------|
|            | U-Turn                         | Left | Thru | Right                          | U-Turn | Left | Thru                            | Right | U-Turn | Left                           | Thru | Right |
| 4:00 PM    | 0                              | 2    | 161  | 1                              | 0      | 1    | 231                             | 1     | 0      | 0                              | 3    | 0     |
| 4:15 PM    | 0                              | 1    | 166  | 1                              | 0      | 1    | 237                             | 3     | 0      | 1                              | 0    | 4     |
| 4:30 PM    | 0                              | 2    | 165  | 0                              | 0      | 0    | 233                             | 2     | 0      | 0                              | 0    | 1     |
| 4:45 PM    | 0                              | 2    | 175  | 1                              | 0      | 1    | 225                             | 1     | 0      | 2                              | 0    | 4     |
| 5:00 PM    | 0                              | 1    | 179  | 0                              | 0      | 2    | 215                             | 1     | 0      | 2                              | 0    | 8     |
| 5:15 PM    | 0                              | 4    | 176  | 1                              | 0      | 1    | 196                             | 0     | 0      | 0                              | 0    | 3     |
| 5:30 PM    | 0                              | 3    | 173  | 0                              | 0      | 1    | 198                             | 1     | 0      | 1                              | 0    | 6     |
| 5:45 PM    | 0                              | 2    | 168  | 1                              | 0      | 0    | 192                             | 1     | 0      | 1                              | 0    | 2     |

| AM PEAK HOUR       |  | Highland Avenue Northeastbound |      |      | Highland Avenue Southwestbound |        |      | Highland Terrace Northwestbound |       |        | Highland Circle Southeastbound |      |       |
|--------------------|--|--------------------------------|------|------|--------------------------------|--------|------|---------------------------------|-------|--------|--------------------------------|------|-------|
| 8:00 AM to 9:00 AM |  | U-Turn                         | Left | Thru | Right                          | U-Turn | Left | Thru                            | Right | U-Turn | Left                           | Thru | Right |
| PHF                |  | 0                              | 5    | 812  | 5                              | 0      | 2    | 774                             | 3     | 0      | 7                              | 0    | 4     |
| HV %               |  | 0.0%                           | 0.0% | 1.0% | 0.0%                           | 0.0%   | 0.0% | 0.6%                            | 0.0%  | 0.0%   | 0.0%                           | 0.0% | 0.0%  |

| PM PEAK HOUR       |  | Highland Avenue Northeastbound |      |      | Highland Avenue Southwestbound |        |      | Highland Terrace Northwestbound |       |        | Highland Circle Southeastbound |      |       |
|--------------------|--|--------------------------------|------|------|--------------------------------|--------|------|---------------------------------|-------|--------|--------------------------------|------|-------|
| 4:15 PM to 5:15 PM |  | U-Turn                         | Left | Thru | Right                          | U-Turn | Left | Thru                            | Right | U-Turn | Left                           | Thru | Right |
| PHF                |  | 0                              | 6    | 685  | 2                              | 0      | 4    | 910                             | 7     | 0      | 5                              | 0    | 21    |
| HV %               |  | 0.0%                           | 0.0% | 0.3% | 0.0%                           | 0.0%   | 0.0% | 0.2%                            | 0.0%  | 0.0%   | 0.0%                           | 0.0% | 0.0%  |

11/6/2017, 8:51 AM, 12239.00\_127\_018\_TMC\_Loc 17

Client: Matt Duranleau  
Project #: 12239.00\_127\_018\_VHb  
BTD #: Location 17  
Location: Needham, MA  
Street 1: Highland Avenue  
Street 2: Highland Terrace / Highland Circle  
Count Date: 10/26/2017  
Day of Week: Thursday  
Weather: Rainy, 55°F



**TRUCKS**

| Start Time | Highland Avenue Northeastbound |      |      | Highland Avenue Southwestbound |        |      | Highland Terrace Northwestbound |       |        | Highland Circle Southeastbound |      |       |
|------------|--------------------------------|------|------|--------------------------------|--------|------|---------------------------------|-------|--------|--------------------------------|------|-------|
|            | U-Turn                         | Left | Thru | Right                          | U-Turn | Left | Thru                            | Right | U-Turn | Left                           | Thru | Right |
| 7:00 AM    | 0                              | 0    | 2    | 0                              | 0      | 0    | 1                               | 0     | 0      | 0                              | 0    | 0     |
| 7:15 AM    | 0                              | 0    | 3    | 0                              | 0      | 0    | 1                               | 0     | 0      | 0                              | 0    | 0     |
| 7:30 AM    | 0                              | 0    | 1    | 0                              | 0      | 0    | 2                               | 0     | 0      | 0                              | 0    | 0     |
| 7:45 AM    | 0                              | 0    | 2    | 0                              | 0      | 0    | 1                               | 0     | 0      | 0                              | 0    | 0     |
| 8:00 AM    | 0                              | 0    | 2    | 0                              | 0      | 0    | 2                               | 0     | 0      | 0                              | 0    | 0     |
| 8:15 AM    | 0                              | 0    | 3    | 0                              | 0      | 0    | 1                               | 0     | 0      | 0                              | 0    | 0     |
| 8:30 AM    | 0                              | 0    | 1    | 0                              | 0      | 0    | 1                               | 0     | 0      | 0                              | 0    | 0     |
| 8:45 AM    | 0                              | 0    | 2    | 0                              | 0      | 0    | 1                               | 0     | 0      | 0                              | 0    | 0     |

| Start Time | Highland Avenue Northeastbound |      |      | Highland Avenue Southwestbound |        |      | Highland Terrace Northwestbound |       |        | Highland Circle Southeastbound |      |       |
|------------|--------------------------------|------|------|--------------------------------|--------|------|---------------------------------|-------|--------|--------------------------------|------|-------|
|            | U-Turn                         | Left | Thru | Right                          | U-Turn | Left | Thru                            | Right | U-Turn | Left                           | Thru | Right |
| 4:00 PM    | 0                              | 0    | 2    | 0                              | 0      | 0    | 0                               | 0     | 0      | 0                              | 0    | 0     |
| 4:15 PM    | 0                              | 0    | 0    | 0                              | 0      | 0    | 0                               | 0     | 0      | 0                              | 0    | 0     |
| 4:30 PM    | 0                              | 0    | 0    | 0                              | 0      | 0    | 1                               | 0     | 0      | 0                              | 0    | 0     |
| 4:45 PM    | 0                              | 0    | 1    | 0                              | 0      | 0    | 0                               | 0     | 0      | 0                              | 0    | 0     |
| 5:00 PM    | 0                              | 0    | 1    | 0                              | 0      | 0    | 1                               | 0     | 0      | 0                              | 0    | 0     |
| 5:15 PM    | 0                              | 1    | 0    | 0                              | 0      | 0    | 1                               | 0     | 0      | 0                              | 0    | 0     |
| 5:30 PM    | 0                              | 0    | 0    | 0                              | 0      | 0    | 0                               | 0     | 0      | 0                              | 0    | 0     |
| 5:45 PM    | 0                              | 1    | 0    | 0                              | 0      | 0    | 0                               | 0     | 0      | 0                              | 0    | 0     |

| AM PEAK HOUR       |  | Highland Avenue Northeastbound |      |      | Highland Avenue Southwestbound |        |      | Highland Terrace Northwestbound |       |        | Highland Circle Southeastbound |      |       |
|--------------------|--|--------------------------------|------|------|--------------------------------|--------|------|---------------------------------|-------|--------|--------------------------------|------|-------|
| 7:15 AM to 8:15 AM |  | U-Turn                         | Left | Thru | Right                          | U-Turn | Left | Thru                            | Right | U-Turn | Left                           | Thru | Right |
| PHF                |  | 0                              | 0    | 8    | 0                              | 0      | 0    | 6                               | 0     | 0      | 0                              | 0    | 0     |
|                    |  | 0.67                           |      |      | 0.75                           |        |      | 0.00                            |       |        | 0.00                           |      |       |

| PM PEAK HOUR       |  | Highland Avenue Northeastbound |      |      | Highland Avenue Southwestbound |        |      | Highland Terrace Northwestbound |       |        | Highland Circle Southeastbound |      |       |
|--------------------|--|--------------------------------|------|------|--------------------------------|--------|------|---------------------------------|-------|--------|--------------------------------|------|-------|
| 4:30 PM to 5:30 PM |  | U-Turn                         | Left | Thru | Right                          | U-Turn | Left | Thru                            | Right | U-Turn | Left                           | Thru | Right |
| PHF                |  | 0                              | 1    | 2    | 0                              | 0      | 0    | 3                               | 0     | 0      | 0                              | 0    | 0     |
|                    |  | 0.75                           |      |      | 0.75                           |        |      | 0.00                            |       |        | 0.00                           |      |       |

11/6/2017, 8:51 AM, 12239.00\_127\_018\_TMC\_Loc 17

Client: Matt Duranleau  
Project #: 12239.00\_127\_018\_VHb  
BTD #: Location 17  
Location: Needham, MA  
Street 1: Highland Avenue  
Street 2: Highland Terrace / Highland Circle  
Count Date: 10/26/2017  
Day of Week: Thursday  
Weather: Rainy, 55°F



PEDESTRIANS & BICYCLES

| Highland Avenue<br>Northwestbound |      |      |       |     | Highland Avenue<br>Southwestbound |      |      |       |     | Highland Terrace<br>Northwestbound |      |      |       |     | Highland Circle<br>Southwestbound |      |      |       |     |
|-----------------------------------|------|------|-------|-----|-----------------------------------|------|------|-------|-----|------------------------------------|------|------|-------|-----|-----------------------------------|------|------|-------|-----|
| Start Time                        | Left | Thru | Right | PED | Start Time                        | Left | Thru | Right | PED | Start Time                         | Left | Thru | Right | PED | Start Time                        | Left | Thru | Right | PED |
| 7:00 AM                           | 0    | 0    | 0     | 0   | 0                                 | 0    | 0    | 0     | 0   | 0                                  | 0    | 0    | 0     | 1   | 0                                 | 0    | 0    | 0     | 0   |
| 7:15 AM                           | 0    | 1    | 0     | 0   | 0                                 | 0    | 0    | 0     | 0   | 0                                  | 0    | 0    | 1     | 0   | 0                                 | 0    | 0    | 0     | 0   |
| 7:30 AM                           | 0    | 0    | 0     | 0   | 0                                 | 0    | 0    | 0     | 0   | 0                                  | 0    | 0    | 0     | 0   | 0                                 | 0    | 0    | 0     | 0   |
| 7:45 AM                           | 0    | 0    | 0     | 0   | 0                                 | 0    | 0    | 0     | 0   | 0                                  | 0    | 0    | 0     | 0   | 0                                 | 0    | 0    | 0     | 1   |
| 8:00 AM                           | 0    | 0    | 0     | 0   | 0                                 | 0    | 0    | 0     | 0   | 0                                  | 1    | 0    | 0     | 0   | 0                                 | 0    | 0    | 0     | 1   |
| 8:15 AM                           | 0    | 0    | 0     | 0   | 0                                 | 0    | 0    | 0     | 0   | 0                                  | 0    | 0    | 0     | 1   | 0                                 | 0    | 0    | 0     | 0   |
| 8:30 AM                           | 0    | 0    | 0     | 0   | 0                                 | 0    | 0    | 0     | 0   | 0                                  | 0    | 0    | 0     | 1   | 0                                 | 0    | 0    | 0     | 2   |
| 8:45 AM                           | 0    | 0    | 0     | 0   | 0                                 | 0    | 0    | 0     | 0   | 0                                  | 0    | 0    | 0     | 0   | 0                                 | 0    | 0    | 0     | 1   |

| Highland Avenue<br>Northwestbound |      |      |       |     | Highland Avenue<br>Southwestbound |      |      |       |     | Highland Terrace<br>Northwestbound |      |      |       |     | Highland Circle<br>Southwestbound |      |      |       |     |
|-----------------------------------|------|------|-------|-----|-----------------------------------|------|------|-------|-----|------------------------------------|------|------|-------|-----|-----------------------------------|------|------|-------|-----|
| Start Time                        | Left | Thru | Right | PED | Start Time                        | Left | Thru | Right | PED | Start Time                         | Left | Thru | Right | PED | Start Time                        | Left | Thru | Right | PED |
| 4:00 PM                           | 0    | 0    | 0     | 1   | 0                                 | 0    | 0    | 0     | 2   | 0                                  | 0    | 0    | 1     | 0   | 0                                 | 0    | 0    | 0     | 0   |
| 4:15 PM                           | 0    | 0    | 0     | 0   | 0                                 | 0    | 0    | 0     | 0   | 0                                  | 0    | 0    | 0     | 0   | 0                                 | 0    | 0    | 0     | 1   |
| 4:30 PM                           | 0    | 0    | 0     | 0   | 0                                 | 0    | 0    | 0     | 0   | 0                                  | 0    | 0    | 1     | 0   | 0                                 | 0    | 0    | 0     | 0   |
| 4:45 PM                           | 0    | 1    | 0     | 0   | 0                                 | 0    | 0    | 0     | 0   | 0                                  | 0    | 0    | 2     | 0   | 0                                 | 0    | 0    | 2     | 0   |
| 5:00 PM                           | 0    | 0    | 0     | 0   | 0                                 | 0    | 0    | 0     | 0   | 0                                  | 0    | 0    | 1     | 0   | 0                                 | 0    | 0    | 3     | 0   |
| 5:15 PM                           | 0    | 0    | 0     | 0   | 0                                 | 0    | 0    | 0     | 0   | 0                                  | 0    | 0    | 0     | 0   | 0                                 | 0    | 0    | 1     | 0   |
| 5:30 PM                           | 0    | 0    | 0     | 0   | 0                                 | 0    | 0    | 0     | 0   | 0                                  | 0    | 0    | 1     | 0   | 0                                 | 0    | 0    | 0     | 0   |
| 5:45 PM                           | 0    | 0    | 0     | 0   | 0                                 | 0    | 0    | 0     | 0   | 0                                  | 0    | 0    | 2     | 0   | 0                                 | 0    | 0    | 0     | 0   |

| AM PEAK HOUR<br>8:00 AM<br>to<br>9:00 AM | Highland Avenue<br>Northwestbound |      |       |     | Highland Avenue<br>Southwestbound |      |       |     | Highland Terrace<br>Northwestbound |      |       |     | Highland Circle<br>Southwestbound |      |       |     |
|------------------------------------------|-----------------------------------|------|-------|-----|-----------------------------------|------|-------|-----|------------------------------------|------|-------|-----|-----------------------------------|------|-------|-----|
|                                          | Left                              | Thru | Right | PED | Left                              | Thru | Right | PED | Left                               | Thru | Right | PED | Left                              | Thru | Right | PED |
|                                          | 0                                 | 0    | 0     | 0   | 0                                 | 1    | 0     | 0   | 0                                  | 0    | 0     | 0   | 2                                 | 0    | 0     | 0   |

| PM PEAK HOUR <sup>1</sup><br>4:15 PM<br>to<br>5:15 PM | Highland Avenue<br>Northwestbound |      |       |     | Highland Avenue<br>Southwestbound |      |       |     | Highland Terrace<br>Southwestbound |      |       |     | Highland Circle<br>Southwestbound |      |       |     |
|-------------------------------------------------------|-----------------------------------|------|-------|-----|-----------------------------------|------|-------|-----|------------------------------------|------|-------|-----|-----------------------------------|------|-------|-----|
|                                                       | Left                              | Thru | Right | PED | Left                              | Thru | Right | PED | Left                               | Thru | Right | PED | Left                              | Thru | Right | PED |
|                                                       | 0                                 | 1    | 0     | 0   | 0                                 | 0    | 0     | 0   | 0                                  | 0    | 0     | 4   | 0                                 | 0    | 0     | 6   |

\*Peak hours corresponds to vehicular peak hours.

11/6/2017, 8:51 AM, 12239.00\_127\_018\_TMC\_Loc 17

Client: Matt Duranleau  
Project #: 12239.00\_127\_018\_VHb  
BTD #: Location 18  
Location: Needham, MA  
Street 1: Highland Avenue  
Street 2: Charles Street  
Count Date: 10/26/2017  
Day of Week: Thursday  
Weather: Rainy, 55°F



TOTAL (CARS & TRUCKS)

| Highland Avenue<br>Northwestbound |        |      |      |       | Highland Avenue<br>Southwestbound |        |      |      |       | Northwestbound |        |      |      |       | Charles Street<br>Southeastbound |        |      |      |       |
|-----------------------------------|--------|------|------|-------|-----------------------------------|--------|------|------|-------|----------------|--------|------|------|-------|----------------------------------|--------|------|------|-------|
| Start Time                        | U-Turn | Left | Thru | Right | Start Time                        | U-Turn | Left | Thru | Right | Start Time     | U-Turn | Left | Thru | Right | Start Time                       | U-Turn | Left | Thru | Right |
| 7:00 AM                           | 0      | 12   | 159  | 0     | 0                                 | 0      | 143  | 8    | 0     | 0              | 0      | 0    | 0    | 0     | 0                                | 0      | 1    | 0    | 5     |
| 7:15 AM                           | 0      | 11   | 168  | 0     | 0                                 | 0      | 155  | 7    | 0     | 0              | 0      | 0    | 0    | 0     | 0                                | 0      | 0    | 0    | 7     |
| 7:30 AM                           | 0      | 10   | 170  | 0     | 0                                 | 0      | 158  | 6    | 0     | 0              | 0      | 0    | 0    | 0     | 0                                | 0      | 1    | 0    | 8     |
| 7:45 AM                           | 0      | 9    | 177  | 0     | 0                                 | 0      | 160  | 4    | 0     | 0              | 0      | 0    | 0    | 0     | 0                                | 0      | 1    | 0    | 10    |
| 8:00 AM                           | 1      | 8    | 183  | 0     | 0                                 | 0      | 163  | 5    | 0     | 0              | 0      | 0    | 0    | 0     | 0                                | 0      | 0    | 0    | 11    |
| 8:15 AM                           | 0      | 9    | 182  | 0     | 0                                 | 0      | 165  | 6    | 0     | 0              | 0      | 0    | 0    | 0     | 0                                | 0      | 2    | 0    | 9     |
| 8:30 AM                           | 0      | 7    | 176  | 0     | 0                                 | 0      | 162  | 4    | 0     | 0              | 0      | 0    | 0    | 0     | 0                                | 0      | 0    | 0    | 7     |
| 8:45 AM                           | 0      | 6    | 171  | 0     | 0                                 | 0      | 159  | 3    | 0     | 0              | 0      | 0    | 0    | 0     | 0                                | 0      | 0    | 1    | 6     |

| Highland Avenue<br>Northwestbound |        |      |      |       | Highland Avenue<br>Southwestbound |        |      |      |       | Northwestbound |        |      |      |       | Charles Street<br>Southeastbound |        |      |      |       |
|-----------------------------------|--------|------|------|-------|-----------------------------------|--------|------|------|-------|----------------|--------|------|------|-------|----------------------------------|--------|------|------|-------|
| Start Time                        | U-Turn | Left | Thru | Right | Start Time                        | U-Turn | Left | Thru | Right | Start Time     | U-Turn | Left | Thru | Right | Start Time                       | U-Turn | Left | Thru | Right |
| 4:00 PM                           | 0      | 11   | 110  | 0     | 0                                 | 0      | 280  | 8    | 0     | 0              | 0      | 0    | 0    | 0     | 0                                | 0      | 4    | 0    | 25    |
| 4:15 PM                           | 0      | 13   | 113  | 0     | 0                                 | 0      | 286  | 7    | 0     | 0              | 0      | 0    | 0    | 0     | 0                                | 0      | 6    | 0    | 27    |
| 4:30 PM                           | 0      | 14   | 114  | 0     | 0                                 | 0      | 301  | 5    | 0     | 0              | 0      | 0    | 0    | 0     | 0                                | 0      | 5    | 0    | 28    |
| 4:45 PM                           | 0      | 16   | 116  | 0     | 0                                 | 0      | 306  | 4    | 0     | 0              | 0      | 0    | 0    | 0     | 0                                | 0      | 6    | 0    | 26    |
| 5:00 PM                           | 0      | 18   | 115  | 0     | 0                                 | 0      | 318  | 3    | 0     | 0              | 0      | 0    | 0    | 0     | 0                                | 0      | 4    | 0    | 30    |
| 5:15 PM                           | 0      | 17   | 117  | 0     | 0                                 | 0      | 323  | 4    | 0     | 0              | 0      | 0    | 0    | 0     | 0                                | 0      | 5    | 0    | 28    |
| 5:30 PM                           | 0      | 15   | 113  | 0     | 0                                 | 0      | 319  | 3    | 0     | 0              | 0      | 0    | 0    | 0     | 0                                | 0      | 3    | 0    | 25    |
| 5:45 PM                           | 0      | 13   | 111  | 0     | 0                                 | 0      | 306  | 2    | 0     | 0              | 0      | 0    | 0    | 0     | 0                                | 0      | 2    | 0    | 23    |

| AM PEAK HOUR<br>7:45 AM<br>to<br>8:45 AM<br><br>PHF<br>HV % | Highland Avenue<br>Northwestbound |      |      |       | Highland Avenue<br>Southwestbound |      |      |       | Northwestbound |      |      |       | Charles Street<br>Southeastbound |      |      |       |
|-------------------------------------------------------------|-----------------------------------|------|------|-------|-----------------------------------|------|------|-------|----------------|------|------|-------|----------------------------------|------|------|-------|
|                                                             | U-Turn                            | Left | Thru | Right | U-Turn                            | Left | Thru | Right | U-Turn         | Left | Thru | Right | U-Turn                           | Left | Thru | Right |
|                                                             | 1                                 | 33   | 718  | 0     | 0                                 | 0    | 650  | 19    | 0              | 0    | 0    | 0     | 0                                | 3    | 0    | 37    |
|                                                             | 0.98                              |      |      |       | 0.98                              |      |      |       | 0.00           |      |      |       | 0.91                             |      |      |       |
|                                                             | 0.0%                              | 0.0% | 1.3% | 0.0%  | 0.0%                              | 0.0% | 2.8% | 0.0%  | 0.0%           | 0.0% | 0.0% | 0.0%  | 0.0%                             | 0.0% | 0.0% | 0.0%  |

| PM PEAK HOUR<br>4:45 PM<br>to<br>5:45 PM<br><br>PHF<br>HV | Highland Avenue<br>Northwestbound |      |      |       | Highland Avenue<br>Southwestbound |      |      |       | Northwestbound |      |      |       | Charles Street<br>Southeastbound |      |      |       |      |
|-----------------------------------------------------------|-----------------------------------|------|------|-------|-----------------------------------|------|------|-------|----------------|------|------|-------|----------------------------------|------|------|-------|------|
|                                                           | U-Turn                            | Left | Thru | Right | U-Turn                            | Left | Thru | Right | U-Turn         | Left | Thru | Right | U-Turn                           | Left | Thru | Right |      |
|                                                           | 0                                 | 66   | 461  | 0     | 0                                 | 0    | 1266 | 14    | 0              | 0    | 0    | 0     | 0                                | 0    | 18   | 0     | 109  |
|                                                           | 0.98                              |      |      |       | 0.98                              |      |      |       | 0.00           |      |      |       | 0.93                             |      |      |       |      |
|                                                           | 0.0%                              | 1.5% | 0.7% | 0.0%  | 0.0%                              | 0.0% | 0.2% | 0.0%  | 0.0%           | 0.0% | 0.0% | 0.0%  | 0.0%                             | 0.0% | 0.0% | 0.0%  | 0.9% |

11/6/2017, 8:53 AM, 12239.00\_127\_018\_TMC\_Loc 18

Client: Matt Duranleau  
Project #: 12239.00\_127\_018\_VHb  
BTD #: Location 18  
Location: Needham, MA  
Street 1: Highland Avenue  
Street 2: Charles Street  
Count Date: 10/26/2017  
Day of Week: Thursday  
Weather: Rainy, 55°F



#### TRUCKS

| Start Time | Highland Avenue Northeastbound |      |      | Highland Avenue Southwestbound |        |      | Northwestbound |       |        | Charles Street Southeastbound |      |       |
|------------|--------------------------------|------|------|--------------------------------|--------|------|----------------|-------|--------|-------------------------------|------|-------|
|            | U-Turn                         | Left | Thru | Right                          | U-Turn | Left | Thru           | Right | U-Turn | Left                          | Thru | Right |
| 7:00 AM    | 0                              | 0    | 2    | 0                              | 0      | 0    | 3              | 0     | 0      | 0                             | 0    | 0     |
| 7:15 AM    | 0                              | 0    | 4    | 0                              | 0      | 0    | 7              | 0     | 0      | 0                             | 0    | 0     |
| 7:30 AM    | 0                              | 0    | 3    | 0                              | 0      | 0    | 4              | 0     | 0      | 0                             | 0    | 0     |
| 7:45 AM    | 0                              | 0    | 2    | 0                              | 0      | 0    | 5              | 0     | 0      | 0                             | 0    | 0     |
| 8:00 AM    | 0                              | 0    | 2    | 0                              | 0      | 0    | 4              | 0     | 0      | 0                             | 0    | 0     |
| 8:15 AM    | 0                              | 0    | 3    | 0                              | 0      | 0    | 6              | 0     | 0      | 0                             | 0    | 0     |
| 8:30 AM    | 0                              | 0    | 2    | 0                              | 0      | 0    | 3              | 0     | 0      | 0                             | 0    | 0     |
| 8:45 AM    | 0                              | 0    | 2    | 0                              | 0      | 0    | 3              | 0     | 0      | 0                             | 0    | 0     |

| Start Time | Highland Avenue Northeastbound |      |      | Highland Avenue Southwestbound |        |      | Northwestbound |       |        | Charles Street Southeastbound |      |       |
|------------|--------------------------------|------|------|--------------------------------|--------|------|----------------|-------|--------|-------------------------------|------|-------|
|            | U-Turn                         | Left | Thru | Right                          | U-Turn | Left | Thru           | Right | U-Turn | Left                          | Thru | Right |
| 4:00 PM    | 0                              | 0    | 2    | 0                              | 0      | 0    | 0              | 0     | 0      | 0                             | 0    | 0     |
| 4:15 PM    | 0                              | 0    | 0    | 0                              | 0      | 0    | 1              | 0     | 0      | 0                             | 0    | 0     |
| 4:30 PM    | 0                              | 0    | 1    | 0                              | 0      | 0    | 2              | 0     | 0      | 0                             | 0    | 0     |
| 4:45 PM    | 0                              | 0    | 1    | 0                              | 0      | 0    | 0              | 0     | 0      | 0                             | 0    | 0     |
| 5:00 PM    | 0                              | 1    | 0    | 0                              | 0      | 0    | 1              | 0     | 0      | 0                             | 0    | 1     |
| 5:15 PM    | 0                              | 0    | 1    | 0                              | 0      | 0    | 0              | 0     | 0      | 0                             | 0    | 0     |
| 5:30 PM    | 0                              | 0    | 1    | 0                              | 0      | 0    | 1              | 0     | 0      | 0                             | 0    | 0     |
| 5:45 PM    | 0                              | 0    | 0    | 0                              | 0      | 0    | 1              | 0     | 0      | 0                             | 0    | 0     |

| AM PEAK HOUR       |  | Highland Avenue Northeastbound |      |      | Highland Avenue Southwestbound |        |      | Northwestbound |       |        | Charles Street Southeastbound |      |       |
|--------------------|--|--------------------------------|------|------|--------------------------------|--------|------|----------------|-------|--------|-------------------------------|------|-------|
| 7:15 AM to 8:15 AM |  | U-Turn                         | Left | Thru | Right                          | U-Turn | Left | Thru           | Right | U-Turn | Left                          | Thru | Right |
| PHF                |  | 0                              | 0    | 11   | 0                              | 0      | 0    | 20             | 0     | 0      | 0                             | 0    | 0     |
|                    |  | 0.69                           |      |      | 0.71                           |        |      | 0.00           |       |        | 0.00                          |      |       |

| PM PEAK HOUR       |  | Highland Avenue Northeastbound |      |      | Highland Avenue Southwestbound |        |      | Northwestbound |       |        | Charles Street Southeastbound |      |       |
|--------------------|--|--------------------------------|------|------|--------------------------------|--------|------|----------------|-------|--------|-------------------------------|------|-------|
| 4:15 PM to 5:15 PM |  | U-Turn                         | Left | Thru | Right                          | U-Turn | Left | Thru           | Right | U-Turn | Left                          | Thru | Right |
| PHF                |  | 0                              | 1    | 2    | 0                              | 0      | 0    | 4              | 0     | 0      | 0                             | 0    | 1     |
|                    |  | 0.75                           |      |      | 0.50                           |        |      | 0.00           |       |        | 0.25                          |      |       |

Client: Matt Duranleau  
Project #: 12239.00\_127\_018\_VHb  
BTD #: Location 18  
Location: Needham, MA  
Street 1: Highland Avenue  
Street 2: Charles Street  
Count Date: 10/26/2017  
Day of Week: Thursday  
Weather: Rainy, 55°F



#### PEDESTRIANS & BICYCLES

| Start Time | Highland Avenue Northeastbound |      |       |     | Highland Avenue Southwestbound |      |       |     | Northwestbound |      |       |     | Charles Street Southeastbound |      |       |     |
|------------|--------------------------------|------|-------|-----|--------------------------------|------|-------|-----|----------------|------|-------|-----|-------------------------------|------|-------|-----|
|            | Left                           | Thru | Right | PED | Left                           | Thru | Right | PED | Left           | Thru | Right | PED | Left                          | Thru | Right | PED |
| 7:00 AM    | 0                              | 0    | 0     | 0   | 0                              | 0    | 0     | 0   | 0              | 0    | 0     | 0   | 0                             | 0    | 0     | 0   |
| 7:15 AM    | 0                              | 0    | 0     | 0   | 0                              | 0    | 0     | 0   | 0              | 0    | 0     | 0   | 0                             | 0    | 0     | 0   |
| 7:30 AM    | 0                              | 0    | 0     | 0   | 0                              | 0    | 0     | 0   | 0              | 0    | 0     | 0   | 0                             | 0    | 0     | 0   |
| 7:45 AM    | 0                              | 0    | 0     | 0   | 0                              | 0    | 0     | 0   | 0              | 0    | 0     | 0   | 0                             | 0    | 0     | 0   |
| 8:00 AM    | 0                              | 0    | 0     | 0   | 0                              | 0    | 0     | 0   | 0              | 0    | 0     | 0   | 0                             | 0    | 0     | 0   |
| 8:15 AM    | 0                              | 0    | 0     | 0   | 0                              | 0    | 0     | 0   | 0              | 0    | 0     | 0   | 0                             | 0    | 0     | 0   |
| 8:30 AM    | 0                              | 0    | 0     | 0   | 0                              | 0    | 0     | 0   | 0              | 0    | 0     | 0   | 0                             | 0    | 0     | 0   |
| 8:45 AM    | 0                              | 0    | 0     | 0   | 0                              | 0    | 0     | 0   | 0              | 0    | 0     | 0   | 0                             | 0    | 0     | 0   |

| Start Time | Highland Avenue Northeastbound |      |       |     | Highland Avenue Southwestbound |      |       |     | Northwestbound |      |       |     | Charles Street Southeastbound |      |       |     |
|------------|--------------------------------|------|-------|-----|--------------------------------|------|-------|-----|----------------|------|-------|-----|-------------------------------|------|-------|-----|
|            | Left                           | Thru | Right | PED | Left                           | Thru | Right | PED | Left           | Thru | Right | PED | Left                          | Thru | Right | PED |
| 4:00 PM    | 0                              | 0    | 0     | 0   | 0                              | 1    | 0     | 0   | 0              | 0    | 0     | 0   | 0                             | 0    | 0     | 3   |
| 4:15 PM    | 0                              | 0    | 0     | 0   | 0                              | 0    | 0     | 0   | 0              | 0    | 0     | 0   | 0                             | 0    | 0     | 0   |
| 4:30 PM    | 0                              | 0    | 0     | 0   | 0                              | 0    | 0     | 0   | 0              | 0    | 0     | 0   | 0                             | 0    | 0     | 0   |
| 4:45 PM    | 0                              | 0    | 0     | 0   | 0                              | 0    | 0     | 0   | 0              | 0    | 0     | 0   | 0                             | 0    | 0     | 0   |
| 5:00 PM    | 0                              | 0    | 0     | 0   | 0                              | 0    | 0     | 0   | 0              | 0    | 0     | 0   | 0                             | 0    | 0     | 1   |
| 5:15 PM    | 0                              | 0    | 0     | 0   | 0                              | 1    | 0     | 0   | 0              | 0    | 0     | 0   | 0                             | 0    | 0     | 0   |
| 5:30 PM    | 0                              | 0    | 0     | 0   | 0                              | 0    | 0     | 0   | 0              | 0    | 0     | 0   | 0                             | 0    | 0     | 1   |
| 5:45 PM    | 0                              | 0    | 0     | 0   | 0                              | 0    | 0     | 0   | 0              | 0    | 0     | 0   | 0                             | 0    | 0     | 0   |

| AM PEAK HOUR       |  | Highland Avenue Northeastbound |      |       |     | Highland Avenue Southwestbound |      |       |     | Northwestbound |      |       |     | Charles Street Southeastbound |      |       |     |
|--------------------|--|--------------------------------|------|-------|-----|--------------------------------|------|-------|-----|----------------|------|-------|-----|-------------------------------|------|-------|-----|
| 7:45 AM to 8:45 AM |  | Left                           | Thru | Right | PED | Left                           | Thru | Right | PED | Left           | Thru | Right | PED | Left                          | Thru | Right | PED |
|                    |  | 0                              | 0    | 0     | 0   | 0                              | 0    | 0     | 0   | 0              | 0    | 0     | 0   | 0                             | 0    | 0     | 4   |

| PM PEAK HOUR       |  | Highland Avenue Northeastbound |      |       |     | Highland Avenue Southwestbound |      |       |     | Northwestbound |      |       |     | Charles Street Southeastbound |      |       |     |
|--------------------|--|--------------------------------|------|-------|-----|--------------------------------|------|-------|-----|----------------|------|-------|-----|-------------------------------|------|-------|-----|
| 4:45 PM to 5:45 PM |  | Left                           | Thru | Right | PED | Left                           | Thru | Right | PED | Left           | Thru | Right | PED | Left                          | Thru | Right | PED |
|                    |  | 0                              | 0    | 0     | 0   | 0                              | 1    | 0     | 0   | 0              | 0    | 0     | 0   | 0                             | 0    | 0     | 4   |

\*Peak hour corresponds to vehicular peak hours.

Client: Matt Duranleau  
Project #: 12239.00\_127\_018\_VHb  
BTD #: Location 19  
Location: Needham, MA  
Street 1: Highland Avenue  
Street 2: Wexford Street  
Count Date: 10/26/2017  
Day of Week: Thursday  
Weather: Rainy, 55°F



TOTAL (CARS & TRUCKS)

| Highland Avenue<br>Northeastbound |        |      |      |       | Highland Avenue<br>Southwestbound |      |      |       |        | Northwestbound |      |       |        |      | Wexford Street<br>Southeastbound |       |  |  |  |
|-----------------------------------|--------|------|------|-------|-----------------------------------|------|------|-------|--------|----------------|------|-------|--------|------|----------------------------------|-------|--|--|--|
| Start Time                        | U-Turn | Left | Thru | Right | U-Turn                            | Left | Thru | Right | U-Turn | Left           | Thru | Right | U-Turn | Left | Thru                             | Right |  |  |  |
| 7:00 AM                           | 3      | 33   | 163  | 0     | 0                                 | 0    | 145  | 3     | 0      | 0              | 0    | 0     | 0      | 8    | 0                                | 9     |  |  |  |
| 7:15 AM                           | 1      | 34   | 169  | 0     | 0                                 | 0    | 158  | 4     | 0      | 0              | 0    | 0     | 0      | 10   | 0                                | 12    |  |  |  |
| 7:30 AM                           | 2      | 31   | 171  | 0     | 0                                 | 0    | 161  | 5     | 0      | 0              | 0    | 0     | 0      | 9    | 0                                | 15    |  |  |  |
| 7:45 AM                           | 1      | 32   | 175  | 0     | 0                                 | 0    | 163  | 6     | 0      | 0              | 0    | 0     | 0      | 11   | 0                                | 19    |  |  |  |
| 8:00 AM                           | 2      | 29   | 179  | 0     | 0                                 | 0    | 168  | 8     | 0      | 0              | 0    | 0     | 0      | 12   | 0                                | 22    |  |  |  |
| 8:15 AM                           | 1      | 30   | 180  | 0     | 0                                 | 0    | 166  | 7     | 0      | 0              | 0    | 0     | 0      | 11   | 0                                | 20    |  |  |  |
| 8:30 AM                           | 1      | 27   | 173  | 0     | 0                                 | 0    | 163  | 8     | 0      | 0              | 0    | 0     | 0      | 10   | 0                                | 17    |  |  |  |
| 8:45 AM                           | 0      | 24   | 168  | 0     | 0                                 | 0    | 160  | 5     | 0      | 0              | 0    | 0     | 0      | 9    | 0                                | 15    |  |  |  |

| Highland Avenue<br>Northeastbound |        |      |      |       | Highland Avenue<br>Southwestbound |      |      |       |        | Northwestbound |      |       |        |      | Wexford Street<br>Southeastbound |       |  |  |  |
|-----------------------------------|--------|------|------|-------|-----------------------------------|------|------|-------|--------|----------------|------|-------|--------|------|----------------------------------|-------|--|--|--|
| Start Time                        | U-Turn | Left | Thru | Right | U-Turn                            | Left | Thru | Right | U-Turn | Left           | Thru | Right | U-Turn | Left | Thru                             | Right |  |  |  |
| 4:00 PM                           | 1      | 29   | 116  | 0     | 0                                 | 0    | 298  | 7     | 0      | 0              | 0    | 0     | 0      | 5    | 0                                | 49    |  |  |  |
| 4:15 PM                           | 0      | 31   | 121  | 0     | 0                                 | 0    | 304  | 9     | 0      | 0              | 0    | 0     | 0      | 6    | 0                                | 47    |  |  |  |
| 4:30 PM                           | 0      | 27   | 122  | 0     | 0                                 | 0    | 321  | 8     | 0      | 0              | 0    | 0     | 0      | 6    | 0                                | 50    |  |  |  |
| 4:45 PM                           | 1      | 28   | 125  | 0     | 0                                 | 0    | 326  | 6     | 0      | 0              | 0    | 0     | 0      | 7    | 0                                | 52    |  |  |  |
| 5:00 PM                           | 0      | 25   | 127  | 0     | 0                                 | 0    | 343  | 5     | 0      | 0              | 0    | 0     | 0      | 5    | 0                                | 51    |  |  |  |
| 5:15 PM                           | 2      | 24   | 128  | 0     | 0                                 | 0    | 347  | 4     | 0      | 0              | 0    | 0     | 0      | 6    | 0                                | 50    |  |  |  |
| 5:30 PM                           | 1      | 23   | 124  | 0     | 0                                 | 0    | 339  | 5     | 0      | 0              | 0    | 0     | 0      | 4    | 0                                | 48    |  |  |  |
| 5:45 PM                           | 0      | 21   | 121  | 0     | 0                                 | 0    | 325  | 4     | 0      | 0              | 0    | 0     | 0      | 3    | 0                                | 45    |  |  |  |

| Highland Avenue Northeastbound |      |      |       | Highland Avenue Southwestbound |      |      |       | Northwestbound |      |      |       | Wexford Street Southeastbound |      |      |       |
|--------------------------------|------|------|-------|--------------------------------|------|------|-------|----------------|------|------|-------|-------------------------------|------|------|-------|
| U-Turn                         | Left | Thru | Right | U-Turn                         | Left | Thru | Right | U-Turn         | Left | Thru | Right | U-Turn                        | Left | Thru | Right |
| 5                              | 118  | 707  | 0     | 0                              | 0    | 660  | 29    | 0              | 0    | 0    | 0     | 0                             | 44   | 0    | 78    |
| PHF                            |      |      |       | 0.98                           |      |      |       | 0.00           |      |      |       | 0.90                          |      |      |       |
| HV %                           |      |      |       | 0.0%                           | 0.8% | 1.3% | 0.0%  | 0.0%           | 0.0% | 2.7% | 0.0%  | 0.0%                          | 0.0% | 0.0% | 1.3%  |

| Highland Avenue Northeastbound |      |      |       | Highland Avenue Southwestbound |      |      |       | Northwestbound |      |      |       | Wexford Street Southeastbound |      |      |       |
|--------------------------------|------|------|-------|--------------------------------|------|------|-------|----------------|------|------|-------|-------------------------------|------|------|-------|
| U-Turn                         | Left | Thru | Right | U-Turn                         | Left | Thru | Right | U-Turn         | Left | Thru | Right | U-Turn                        | Left | Thru | Right |
| 4                              | 160  | 564  | 0     | 0                              | 0    | 1355 | 29    | 0              | 0    | 0    | 0     | 0                             | 22   | 0    | 291   |
| PHF                            |      |      |       | 0.99                           |      |      |       | 0.00           |      |      |       | 0.94                          |      |      |       |
| HV %                           |      |      |       | 0.0%                           | 0.0% | 0.6% | 0.0%  | 0.0%           | 0.0% | 0.1% | 0.0%  | 0.0%                          | 0.0% | 0.0% | 0.0%  |

11/6/2017, 8:56 AM, 12239.00\_127\_018\_TMC\_Loc 19

Client: Matt Duranleau  
Project #: 12239.00\_127\_018\_VHb  
BTD #: Location 19  
Location: Needham, MA  
Street 1: Highland Avenue  
Street 2: Wexford Street  
Count Date: 10/26/2017  
Day of Week: Thursday  
Weather: Rainy, 55°F



TRUCKS

| Highland Avenue<br>Northeastbound |        |      |      |       | Highland Avenue<br>Southwestbound |      |      |       |        | Northwestbound |      |       |        |      | Wexford Street<br>Southeastbound |       |  |  |  |
|-----------------------------------|--------|------|------|-------|-----------------------------------|------|------|-------|--------|----------------|------|-------|--------|------|----------------------------------|-------|--|--|--|
| Start Time                        | U-Turn | Left | Thru | Right | U-Turn                            | Left | Thru | Right | U-Turn | Left           | Thru | Right | U-Turn | Left | Thru                             | Right |  |  |  |
| 7:00 AM                           | 0      | 0    | 2    | 0     | 0                                 | 0    | 3    | 0     | 0      | 0              | 0    | 0     | 0      | 0    | 0                                | 0     |  |  |  |
| 7:15 AM                           | 0      | 0    | 4    | 0     | 0                                 | 0    | 7    | 0     | 0      | 0              | 0    | 0     | 0      | 0    | 0                                | 0     |  |  |  |
| 7:30 AM                           | 0      | 0    | 3    | 0     | 0                                 | 0    | 4    | 0     | 0      | 0              | 0    | 0     | 0      | 0    | 0                                | 0     |  |  |  |
| 7:45 AM                           | 0      | 0    | 2    | 0     | 0                                 | 0    | 5    | 0     | 0      | 0              | 0    | 0     | 0      | 0    | 0                                | 0     |  |  |  |
| 8:00 AM                           | 0      | 0    | 3    | 0     | 0                                 | 0    | 3    | 0     | 0      | 0              | 0    | 0     | 0      | 0    | 0                                | 0     |  |  |  |
| 8:15 AM                           | 0      | 1    | 2    | 0     | 0                                 | 0    | 7    | 0     | 0      | 0              | 0    | 0     | 0      | 0    | 0                                | 1     |  |  |  |
| 8:30 AM                           | 0      | 0    | 2    | 0     | 0                                 | 0    | 3    | 0     | 0      | 0              | 0    | 0     | 0      | 0    | 0                                | 0     |  |  |  |
| 8:45 AM                           | 0      | 0    | 2    | 0     | 0                                 | 0    | 3    | 0     | 0      | 0              | 0    | 0     | 0      | 0    | 0                                | 0     |  |  |  |

| Highland Avenue<br>Northeastbound |        |      |      |       | Highland Avenue<br>Southwestbound |      |      |       |        | Northwestbound |      |       |        |      | Wexford Street<br>Southeastbound |       |  |  |  |
|-----------------------------------|--------|------|------|-------|-----------------------------------|------|------|-------|--------|----------------|------|-------|--------|------|----------------------------------|-------|--|--|--|
| Start Time                        | U-Turn | Left | Thru | Right | U-Turn                            | Left | Thru | Right | U-Turn | Left           | Thru | Right | U-Turn | Left | Thru                             | Right |  |  |  |
| 4:00 PM                           | 0      | 0    | 2    | 0     | 0                                 | 0    | 0    | 0     | 0      | 0              | 0    | 0     | 0      | 0    | 0                                | 0     |  |  |  |
| 4:15 PM                           | 0      | 0    | 1    | 0     | 0                                 | 0    | 1    | 0     | 0      | 0              | 0    | 0     | 0      | 0    | 0                                | 0     |  |  |  |
| 4:30 PM                           | 0      | 0    | 0    | 0     | 0                                 | 0    | 2    | 0     | 0      | 0              | 0    | 0     | 0      | 0    | 0                                | 0     |  |  |  |
| 4:45 PM                           | 0      | 0    | 1    | 0     | 0                                 | 0    | 0    | 0     | 0      | 0              | 0    | 0     | 0      | 1    | 0                                | 0     |  |  |  |
| 5:00 PM                           | 0      | 0    | 1    | 0     | 0                                 | 0    | 1    | 0     | 0      | 0              | 0    | 0     | 0      | 0    | 0                                | 0     |  |  |  |
| 5:15 PM                           | 0      | 0    | 0    | 0     | 0                                 | 0    | 1    | 0     | 0      | 0              | 0    | 0     | 0      | 0    | 0                                | 0     |  |  |  |
| 5:30 PM                           | 0      | 0    | 1    | 0     | 0                                 | 0    | 0    | 0     | 0      | 0              | 0    | 0     | 0      | 1    | 0                                | 0     |  |  |  |
| 5:45 PM                           | 0      | 0    | 0    | 0     | 0                                 | 0    | 1    | 0     | 0      | 0              | 0    | 0     | 0      | 0    | 0                                | 0     |  |  |  |

| Highland Avenue Northeastbound |      |      |       | Highland Avenue Southwestbound |      |      |       | Northwestbound |      |      |       | Wexford Street Southeastbound |      |      |       |
|--------------------------------|------|------|-------|--------------------------------|------|------|-------|----------------|------|------|-------|-------------------------------|------|------|-------|
| U-Turn                         | Left | Thru | Right | U-Turn                         | Left | Thru | Right | U-Turn         | Left | Thru | Right | U-Turn                        | Left | Thru | Right |
| 0                              | 0    | 12   | 0     | 0                              | 0    | 19   | 0     | 0              | 0    | 0    | 0     | 0                             | 0    | 0    | 0     |
| PHF                            |      |      |       | 0.75                           |      |      |       | 0.68           |      |      |       | 0.00                          |      |      |       |

| Highland Avenue Northeastbound |      |      |       | Highland Avenue Southwestbound |      |      |       | Northwestbound |      |      |       | Wexford Street Southeastbound |      |      |       |
|--------------------------------|------|------|-------|--------------------------------|------|------|-------|----------------|------|------|-------|-------------------------------|------|------|-------|
| U-Turn                         | Left | Thru | Right | U-Turn                         | Left | Thru | Right | U-Turn         | Left | Thru | Right | U-Turn                        | Left | Thru | Right |
| 0                              | 0    | 4    | 0     | 0                              | 0    | 3    | 0     | 0              | 0    | 0    | 0     | 0                             | 0    | 0    | 0     |
| PHF                            |      |      |       | 0.50                           |      |      |       | 0.38           |      |      |       | 0.00                          |      |      |       |

11/6/2017, 8:56 AM, 12239.00\_127\_018\_TMC\_Loc 19

Client: Matt Duranleau  
Project #: 12239.00\_127\_018\_VHB  
BTD #: Location 19  
Location: Needham, MA  
Street 1: Highland Avenue  
Street 2: Wexford Street  
Count Date: 10/26/2017  
Day of Week: Thursday  
Weather: Rainy, 55°F



PEDESTRIANS & BICYCLES

| Highland Avenue<br>Northbound |      |      |       |     | Highland Avenue<br>Southbound |      |      |       |     | Northwestbound |      |      |       |     | Wexford Street<br>Southbound |      |      |       |     |
|-------------------------------|------|------|-------|-----|-------------------------------|------|------|-------|-----|----------------|------|------|-------|-----|------------------------------|------|------|-------|-----|
| Start Time                    | Left | Thru | Right | PED | Start Time                    | Left | Thru | Right | PED | Start Time     | Left | Thru | Right | PED | Start Time                   | Left | Thru | Right | PED |
| 7:00 AM                       | 0    | 0    | 0     | 0   | 0                             | 0    | 0    | 0     | 0   | 0              | 0    | 0    | 0     | 0   | 0                            | 0    | 0    | 0     | 0   |
| 7:15 AM                       | 0    | 0    | 0     | 0   | 0                             | 0    | 0    | 0     | 0   | 0              | 0    | 0    | 0     | 0   | 0                            | 0    | 0    | 0     | 1   |
| 7:30 AM                       | 0    | 0    | 0     | 0   | 0                             | 0    | 0    | 0     | 0   | 0              | 0    | 0    | 0     | 0   | 0                            | 0    | 0    | 0     | 0   |
| 7:45 AM                       | 0    | 0    | 0     | 0   | 0                             | 0    | 0    | 0     | 0   | 0              | 0    | 0    | 0     | 0   | 0                            | 0    | 0    | 0     | 2   |
| 8:00 AM                       | 0    | 0    | 0     | 0   | 0                             | 0    | 0    | 0     | 0   | 0              | 0    | 0    | 0     | 0   | 0                            | 0    | 0    | 0     | 0   |
| 8:15 AM                       | 0    | 0    | 0     | 0   | 0                             | 0    | 0    | 0     | 0   | 0              | 0    | 0    | 0     | 0   | 0                            | 0    | 0    | 0     | 1   |
| 8:30 AM                       | 0    | 0    | 0     | 0   | 0                             | 0    | 0    | 0     | 0   | 0              | 0    | 0    | 0     | 0   | 0                            | 0    | 0    | 0     | 1   |
| 8:45 AM                       | 0    | 0    | 0     | 0   | 0                             | 0    | 0    | 0     | 0   | 0              | 0    | 0    | 0     | 0   | 0                            | 0    | 0    | 0     | 1   |

| Highland Avenue<br>Northbound |      |      |       |     | Highland Avenue<br>Southbound |      |      |       |     | Northwestbound |      |      |       |     | Wexford Street<br>Southbound |      |      |       |     |
|-------------------------------|------|------|-------|-----|-------------------------------|------|------|-------|-----|----------------|------|------|-------|-----|------------------------------|------|------|-------|-----|
| Start Time                    | Left | Thru | Right | PED | Start Time                    | Left | Thru | Right | PED | Start Time     | Left | Thru | Right | PED | Start Time                   | Left | Thru | Right | PED |
| 4:00 PM                       | 0    | 0    | 0     | 0   | 0                             | 1    | 0    | 0     | 0   | 0              | 0    | 0    | 0     | 0   | 0                            | 0    | 0    | 0     | 1   |
| 4:15 PM                       | 0    | 0    | 0     | 0   | 0                             | 0    | 0    | 0     | 0   | 0              | 0    | 0    | 0     | 0   | 0                            | 0    | 0    | 0     | 1   |
| 4:30 PM                       | 0    | 0    | 0     | 0   | 0                             | 0    | 0    | 0     | 0   | 0              | 0    | 0    | 0     | 0   | 0                            | 0    | 0    | 0     | 3   |
| 4:45 PM                       | 0    | 0    | 0     | 0   | 0                             | 0    | 0    | 0     | 0   | 0              | 0    | 0    | 0     | 0   | 0                            | 0    | 0    | 0     | 0   |
| 5:00 PM                       | 0    | 0    | 0     | 0   | 0                             | 0    | 0    | 0     | 0   | 0              | 0    | 0    | 0     | 0   | 0                            | 0    | 0    | 0     | 1   |
| 5:15 PM                       | 0    | 0    | 0     | 0   | 0                             | 0    | 0    | 0     | 0   | 0              | 0    | 0    | 0     | 0   | 0                            | 0    | 0    | 0     | 1   |
| 5:30 PM                       | 0    | 0    | 0     | 0   | 0                             | 0    | 0    | 0     | 0   | 0              | 0    | 0    | 0     | 0   | 0                            | 0    | 0    | 0     | 0   |
| 5:45 PM                       | 0    | 0    | 0     | 0   | 0                             | 0    | 0    | 0     | 0   | 0              | 0    | 0    | 0     | 0   | 0                            | 0    | 0    | 0     | 0   |

| Highland Avenue<br>Northbound |      |      |       |     | Highland Avenue<br>Southbound |      |      |       |     | Northwestbound |      |      |       |     | Wexford Street<br>Southbound |      |      |       |     |
|-------------------------------|------|------|-------|-----|-------------------------------|------|------|-------|-----|----------------|------|------|-------|-----|------------------------------|------|------|-------|-----|
| Start Time                    | Left | Thru | Right | PED | Start Time                    | Left | Thru | Right | PED | Start Time     | Left | Thru | Right | PED | Start Time                   | Left | Thru | Right | PED |
| 7:45 AM                       | 0    | 0    | 0     | 0   | 0                             | 0    | 0    | 0     | 0   | 0              | 0    | 0    | 0     | 0   | 0                            | 0    | 0    | 0     | 4   |
| 8:45 AM                       | 0    | 0    | 0     | 0   | 0                             | 0    | 0    | 0     | 0   | 0              | 0    | 0    | 0     | 0   | 0                            | 0    | 0    | 0     | 0   |

| Highland Avenue<br>Northbound |      |      |       |     | Highland Avenue<br>Southbound |      |      |       |     | Northwestbound |      |      |       |     | Wexford Street<br>Southbound |      |      |       |     |
|-------------------------------|------|------|-------|-----|-------------------------------|------|------|-------|-----|----------------|------|------|-------|-----|------------------------------|------|------|-------|-----|
| Start Time                    | Left | Thru | Right | PED | Start Time                    | Left | Thru | Right | PED | Start Time     | Left | Thru | Right | PED | Start Time                   | Left | Thru | Right | PED |
| 4:45 PM                       | 0    | 0    | 0     | 0   | 0                             | 0    | 0    | 0     | 0   | 0              | 0    | 0    | 0     | 0   | 0                            | 0    | 0    | 0     | 2   |
| 5:45 PM                       | 0    | 0    | 0     | 0   | 0                             | 0    | 0    | 0     | 0   | 0              | 0    | 0    | 0     | 0   | 0                            | 0    | 0    | 0     | 0   |

\*Peak hours corresponds to vehicular peak hours.

11/8/2017, 8:56 AM, 12239.00\_127\_018\_TMC\_Loc 19

Client: Matthew Duranleau  
Project #: 168\_030\_VHB  
BTD #: Location 1  
Location: Needham, MA  
Street 1: Highland Avenue  
Street 2: I-95 NB On Ramp/ NB Off Ramp  
Count Date: 1/31/2018  
Day of Week: Wednesday  
Weather: Sun w/ Clouds, 30°F



TOTAL (CARS & TRUCKS)

| I-95 NB Off Ramp<br>Northbound |        |      |      |       | I-95 NB On Ramp<br>Southbound |        |      |      |       | Highland Avenue<br>Eastbound |        |      |      |       | Highland Avenue<br>Westbound |        |      |      |       |
|--------------------------------|--------|------|------|-------|-------------------------------|--------|------|------|-------|------------------------------|--------|------|------|-------|------------------------------|--------|------|------|-------|
| Start Time                     | U-Turn | Left | Thru | Right | Start Time                    | U-Turn | Left | Thru | Right | Start Time                   | U-Turn | Left | Thru | Right | Start Time                   | U-Turn | Left | Thru | Right |
| 7:00 AM                        | 0      | 0    | 0    | 81    | 0                             | 0      | 0    | 0    | 0     | 0                            | 0      | 213  | 0    | 0     | 0                            | 0      | 98   | 72   | 0     |
| 7:15 AM                        | 0      | 0    | 0    | 84    | 0                             | 0      | 0    | 0    | 0     | 0                            | 0      | 242  | 0    | 0     | 0                            | 0      | 113  | 74   | 0     |
| 7:30 AM                        | 0      | 0    | 0    | 75    | 0                             | 0      | 0    | 0    | 0     | 0                            | 0      | 256  | 0    | 0     | 0                            | 0      | 123  | 80   | 0     |
| 7:45 AM                        | 0      | 0    | 0    | 63    | 0                             | 0      | 0    | 0    | 0     | 0                            | 0      | 285  | 0    | 0     | 0                            | 0      | 135  | 92   | 0     |
| 8:00 AM                        | 0      | 0    | 0    | 64    | 0                             | 0      | 0    | 0    | 0     | 0                            | 0      | 291  | 0    | 0     | 0                            | 0      | 139  | 77   | 0     |
| 8:15 AM                        | 0      | 0    | 0    | 62    | 0                             | 0      | 0    | 0    | 0     | 0                            | 0      | 326  | 0    | 0     | 0                            | 0      | 135  | 68   | 0     |
| 8:30 AM                        | 0      | 0    | 0    | 65    | 0                             | 0      | 0    | 0    | 0     | 0                            | 0      | 347  | 0    | 0     | 0                            | 0      | 133  | 67   | 0     |
| 8:45 AM                        | 0      | 0    | 0    | 61    | 0                             | 0      | 0    | 0    | 0     | 0                            | 0      | 339  | 0    | 0     | 0                            | 0      | 129  | 65   | 0     |

| I-95 NB Off Ramp<br>Northbound |        |      |      |       | I-95 NB On Ramp<br>Southbound |        |      |      |       | Highland Avenue<br>Eastbound |        |      |      |       | Highland Avenue<br>Westbound |        |      |      |       |
|--------------------------------|--------|------|------|-------|-------------------------------|--------|------|------|-------|------------------------------|--------|------|------|-------|------------------------------|--------|------|------|-------|
| Start Time                     | U-Turn | Left | Thru | Right | Start Time                    | U-Turn | Left | Thru | Right | Start Time                   | U-Turn | Left | Thru | Right | Start Time                   | U-Turn | Left | Thru | Right |
| 4:00 PM                        | 0      | 0    | 0    | 33    | 0                             | 0      | 0    | 0    | 0     | 0                            | 0      | 161  | 0    | 0     | 0                            | 0      | 186  | 166  | 0     |
| 4:15 PM                        | 0      | 0    | 0    | 35    | 0                             | 0      | 0    | 0    | 0     | 0                            | 0      | 162  | 0    | 0     | 0                            | 0      | 188  | 169  | 0     |
| 4:30 PM                        | 0      | 0    | 0    | 37    | 0                             | 0      | 0    | 0    | 0     | 0                            | 0      | 140  | 0    | 0     | 0                            | 0      | 185  | 169  | 0     |
| 4:45 PM                        | 0      | 0    | 0    | 34    | 0                             | 0      | 0    | 0    | 0     | 0                            | 0      | 159  | 0    | 0     | 0                            | 0      | 179  | 161  | 0     |
| 5:00 PM                        | 0      | 0    | 0    | 39    | 0                             | 0      | 0    | 0    | 0     | 0                            | 0      | 178  | 0    | 0     | 0                            | 0      | 220  | 186  | 0     |
| 5:15 PM                        | 0      | 0    | 0    | 43    | 0                             | 0      | 0    | 0    | 0     | 0                            | 0      | 189  | 0    | 0     | 0                            | 0      | 247  | 203  | 0     |
| 5:30 PM                        | 0      | 0    | 0    | 41    | 0                             | 0      | 0    | 0    | 0     | 0                            | 0      | 182  | 0    | 0     | 0                            | 0      | 249  | 198  | 0     |
| 5:45 PM                        | 0      | 0    | 0    | 37    | 0                             | 0      | 0    | 0    | 0     | 0                            | 0      | 177  | 0    | 0     | 0                            | 0      | 242  | 192  | 0     |

| I-95 NB Off Ramp<br>Northbound |        |      |      |       | I-95 NB On Ramp<br>Southbound |        |      |      |       | Highland Avenue<br>Eastbound |        |      |      |       | Highland Avenue<br>Westbound |        |      |      |       |
|--------------------------------|--------|------|------|-------|-------------------------------|--------|------|------|-------|------------------------------|--------|------|------|-------|------------------------------|--------|------|------|-------|
| Start Time                     | U-Turn | Left | Thru | Right | Start Time                    | U-Turn | Left | Thru | Right | Start Time                   | U-Turn | Left | Thru | Right | Start Time                   | U-Turn | Left | Thru | Right |
| 8:00 AM to 9:00 AM             | 0      | 0    | 0    | 252   | 0                             | 0      | 0    | 0    | 0     | 0                            | 0      | 1303 | 0    | 0     | 0                            | 0      | 536  | 277  | 0     |
| PHF                            | 0.97   |      |      |       | 0.00                          |        |      |      |       | 0.94                         |        |      |      |       | 0.94                         |        |      |      |       |
| HV %                           | 0.0%   | 0.0% | 0.0% | 1.6%  | 0.0%                          | 0.0%   | 0.0% | 0.0% | 0.0%  | 0.0%                         | 0.0%   | 1.2% | 0.0% | 0.0%  | 0.0%                         | 0.0%   | 0.0% | 3.0% | 4.3%  |

| I-95 NB Off Ramp<br>Northbound |        |      |      |       | I-95 NB On Ramp<br>Southbound |        |      |      |       | Highland Avenue<br>Eastbound |        |      |      |       | Highland Avenue<br>Westbound |        |      |      |       |
|--------------------------------|--------|------|------|-------|-------------------------------|--------|------|------|-------|------------------------------|--------|------|------|-------|------------------------------|--------|------|------|-------|
| Start Time                     | U-Turn | Left | Thru | Right | Start Time                    | U-Turn | Left | Thru | Right | Start Time                   | U-Turn | Left | Thru | Right | Start Time                   | U-Turn | Left | Thru | Right |
| 5:00 PM to 6:00 PM             | 0      | 0    | 0    | 160   | 0                             | 0      | 0    | 0    | 0     | 0                            | 0      | 728  | 0    | 0     | 0                            | 0      | 958  | 779  | 0     |
| PHF                            | 0.93   |      |      |       | 0.00                          |        |      |      |       | 0.96                         |        |      |      |       | 0.97                         |        |      |      |       |
| HV %                           | 0.0%   | 0.0% | 0.0% | 0.6%  | 0.0%                          | 0.0%   | 0.0% | 0.0% | 0.0%  | 0.0%                         | 0.0%   | 0.6% | 0.0% | 0.0%  | 0.0%                         | 0.0%   | 0.0% | 0.5% | 0.3%  |

2/1/2018, 6:32 PM, 168\_030\_TMC\_Loc 1

Client: Matthew Duranleau  
Project #: 168\_030\_VHB  
BTD #: Location 1  
Location: Needham, MA  
Street 1: Highland Avenue  
Street 2: I-95 NB On Ramp/ NB Off Ramp  
Count Date: 1/31/2018  
Day of Week: Wednesday  
Weather: Sun w/ Clouds, 30°F



#### TRUCKS

| I-95 NB Off Ramp<br>Northbound |        |      |      | I-95 NB On Ramp<br>Southbound |        |      |      | Highland Avenue<br>Eastbound |        |      |      | Highland Avenue<br>Westbound |        |      |      |       |
|--------------------------------|--------|------|------|-------------------------------|--------|------|------|------------------------------|--------|------|------|------------------------------|--------|------|------|-------|
| Start Time                     | U-Turn | Left | Thru | Right                         | U-Turn | Left | Thru | Right                        | U-Turn | Left | Thru | Right                        | U-Turn | Left | Thru | Right |
| 7:00 AM                        | 0      | 0    | 0    | 2                             | 0      | 0    | 0    | 0                            | 0      | 0    | 1    | 0                            | 0      | 0    | 4    | 0     |
| 7:15 AM                        | 0      | 0    | 0    | 1                             | 0      | 0    | 0    | 0                            | 0      | 0    | 5    | 0                            | 0      | 0    | 2    | 1     |
| 7:30 AM                        | 0      | 0    | 0    | 1                             | 0      | 0    | 0    | 0                            | 0      | 0    | 4    | 0                            | 0      | 0    | 4    | 0     |
| 7:45 AM                        | 0      | 0    | 0    | 1                             | 0      | 0    | 0    | 0                            | 0      | 0    | 3    | 0                            | 0      | 0    | 5    | 3     |
| 8:00 AM                        | 0      | 0    | 0    | 2                             | 0      | 0    | 0    | 0                            | 0      | 0    | 4    | 0                            | 0      | 0    | 5    | 2     |
| 8:15 AM                        | 0      | 0    | 0    | 1                             | 0      | 0    | 0    | 0                            | 0      | 0    | 3    | 0                            | 0      | 0    | 4    | 3     |
| 8:30 AM                        | 0      | 0    | 0    | 0                             | 0      | 0    | 0    | 0                            | 0      | 0    | 5    | 0                            | 0      | 0    | 3    | 4     |
| 8:45 AM                        | 0      | 0    | 0    | 1                             | 0      | 0    | 0    | 0                            | 0      | 0    | 4    | 0                            | 0      | 0    | 4    | 3     |

| I-95 NB Off Ramp<br>Northbound |        |      |      |       | I-95 NB On Ramp<br>Southbound |      |      |       |        | Highland Avenue<br>Eastbound |      |       |        |      | Highland Avenue<br>Westbound |       |  |  |  |
|--------------------------------|--------|------|------|-------|-------------------------------|------|------|-------|--------|------------------------------|------|-------|--------|------|------------------------------|-------|--|--|--|
| Start Time                     | U-Turn | Left | Thru | Right | U-Turn                        | Left | Thru | Right | U-Turn | Left                         | Thru | Right | U-Turn | Left | Thru                         | Right |  |  |  |
| 4:00 PM                        | 0      | 0    | 0    | 0     | 0                             | 0    | 0    | 0     | 0      | 0                            | 1    | 0     | 0      | 0    | 3                            | 0     |  |  |  |
| 4:15 PM                        | 0      | 0    | 0    | 0     | 0                             | 0    | 0    | 0     | 0      | 0                            | 4    | 0     | 0      | 0    | 1                            | 2     |  |  |  |
| 4:30 PM                        | 0      | 0    | 0    | 1     | 0                             | 0    | 0    | 0     | 0      | 0                            | 4    | 0     | 0      | 0    | 1                            | 2     |  |  |  |
| 4:45 PM                        | 0      | 0    | 0    | 1     | 0                             | 0    | 0    | 0     | 0      | 0                            | 0    | 0     | 0      | 0    | 2                            | 0     |  |  |  |
| 5:00 PM                        | 0      | 0    | 0    | 0     | 0                             | 0    | 0    | 0     | 0      | 0                            | 1    | 0     | 0      | 0    | 3                            | 1     |  |  |  |
| 5:15 PM                        | 0      | 0    | 0    | 1     | 0                             | 0    | 0    | 0     | 0      | 0                            | 2    | 0     | 0      | 0    | 1                            | 0     |  |  |  |
| 5:30 PM                        | 0      | 0    | 0    | 0     | 0                             | 0    | 0    | 0     | 0      | 0                            | 1    | 0     | 0      | 0    | 0                            | 1     |  |  |  |
| 5:45 PM                        | 0      | 0    | 0    | 0     | 0                             | 0    | 0    | 0     | 0      | 0                            | 0    | 0     | 0      | 0    | 1                            | 0     |  |  |  |

| AM PEAK HOUR<br>7:45 AM<br>to<br>8:45 AM<br><br>PHF | I-95 NB Off Ramp<br>Northbound |      |      |       | I-95 NB On Ramp<br>Southbound |      |      |       | Highland Avenue<br>Eastbound |      |      |       | Highland Avenue<br>Westbound |      |      |       |
|-----------------------------------------------------|--------------------------------|------|------|-------|-------------------------------|------|------|-------|------------------------------|------|------|-------|------------------------------|------|------|-------|
|                                                     | U-Turn                         | Left | Thru | Right | U-Turn                        | Left | Thru | Right | U-Turn                       | Left | Thru | Right | U-Turn                       | Left | Thru | Right |
|                                                     | 0                              | 0    | 0    | 4     | 0                             | 0    | 0    | 0     | 0                            | 0    | 15   | 0     | 0                            | 0    | 17   | 12    |
|                                                     | 0.50                           |      |      |       | 0.00                          |      |      |       | 0.75                         |      |      |       | 0.91                         |      |      |       |

| PM PEAK HOUR<br>4:15 PM<br>to<br>5:15 PM<br><br>PHF | I-95 NB Off Ramp<br>Northbound |      |      |       | I-95 NB On Ramp<br>Southbound |      |      |       | Highland Avenue<br>Eastbound |      |      |       | Highland Avenue<br>Westbound |      |      |       |
|-----------------------------------------------------|--------------------------------|------|------|-------|-------------------------------|------|------|-------|------------------------------|------|------|-------|------------------------------|------|------|-------|
|                                                     | U-Turn                         | Left | Thru | Right | U-Turn                        | Left | Thru | Right | U-Turn                       | Left | Thru | Right | U-Turn                       | Left | Thru | Right |
|                                                     | 0                              | 0    | 0    | 2     | 0                             | 0    | 0    | 0     | 0                            | 0    | 9    | 0     | 0                            | 0    | 7    | 5     |
|                                                     | 0.50                           |      |      |       | 0.00                          |      |      |       | 0.56                         |      |      |       | 0.75                         |      |      |       |

Client: Matthew Duranleau  
Project #: 168\_030\_VHB  
BTD #: Location 1  
Location: Needham, MA  
Street 1: Highland Avenue  
Street 2: I-95 NB On Ramp/ NB Off Ramp  
Count Date: 1/31/2018  
Day of Week: Wednesday  
Weather: Sun w/ Clouds, 30°F



#### PEDESTRIANS & BICYCLES

| I-95 NB Off Ramp<br>Northbound |      |      |       |     | I-95 NB On Ramp<br>Southbound |      |       |     |      | Highland Avenue<br>Eastbound |       |     |      |      | Highland Avenue<br>Westbound |     |  |  |  |
|--------------------------------|------|------|-------|-----|-------------------------------|------|-------|-----|------|------------------------------|-------|-----|------|------|------------------------------|-----|--|--|--|
| Start Time                     | Left | Thru | Right | PED | Left                          | Thru | Right | PED | Left | Thru                         | Right | PED | Left | Thru | Right                        | PED |  |  |  |
| 7:00 AM                        | 0    | 0    | 0     | 0   | 0                             | 0    | 0     | 0   | 0    | 0                            | 0     | 0   | 0    | 0    | 0                            | 0   |  |  |  |
| 7:15 AM                        | 0    | 0    | 0     | 0   | 0                             | 0    | 0     | 0   | 0    | 0                            | 0     | 0   | 0    | 0    | 0                            | 0   |  |  |  |
| 7:30 AM                        | 0    | 0    | 0     | 0   | 0                             | 0    | 0     | 0   | 0    | 0                            | 0     | 0   | 0    | 0    | 0                            | 0   |  |  |  |
| 7:45 AM                        | 0    | 0    | 0     | 0   | 0                             | 0    | 0     | 0   | 0    | 0                            | 0     | 0   | 0    | 0    | 0                            | 0   |  |  |  |
| 8:00 AM                        | 0    | 0    | 0     | 0   | 0                             | 0    | 0     | 0   | 0    | 0                            | 0     | 0   | 0    | 0    | 0                            | 0   |  |  |  |
| 8:15 AM                        | 0    | 0    | 0     | 1   | 0                             | 0    | 0     | 0   | 0    | 0                            | 0     | 0   | 0    | 0    | 0                            | 0   |  |  |  |
| 8:30 AM                        | 0    | 0    | 0     | 0   | 0                             | 0    | 0     | 0   | 0    | 0                            | 0     | 0   | 0    | 0    | 0                            | 0   |  |  |  |
| 8:45 AM                        | 0    | 0    | 0     | 1   | 0                             | 0    | 0     | 0   | 0    | 0                            | 0     | 0   | 0    | 0    | 0                            | 0   |  |  |  |

| I-95 NB Off Ramp<br>Southbound |      |      |       |     | I-95 NB On Ramp<br>Southbound |      |       |     |      | Highland Avenue<br>Eastbound |       |     |      |      | Highland Avenue<br>Westbound |     |  |  |  |
|--------------------------------|------|------|-------|-----|-------------------------------|------|-------|-----|------|------------------------------|-------|-----|------|------|------------------------------|-----|--|--|--|
| Start Time                     | Left | Thru | Right | PED | Left                          | Thru | Right | PED | Left | Thru                         | Right | PED | Left | Thru | Right                        | PED |  |  |  |
| 4:00 PM                        | 0    | 0    | 0     | 0   | 0                             | 0    | 0     | 0   | 0    | 0                            | 0     | 0   | 0    | 0    | 0                            | 0   |  |  |  |
| 4:15 PM                        | 0    | 0    | 0     | 0   | 0                             | 0    | 1     | 0   | 0    | 0                            | 0     | 0   | 0    | 0    | 0                            | 0   |  |  |  |
| 4:30 PM                        | 0    | 0    | 0     | 0   | 0                             | 0    | 1     | 0   | 0    | 0                            | 0     | 0   | 0    | 0    | 0                            | 0   |  |  |  |
| 4:45 PM                        | 0    | 0    | 0     | 0   | 0                             | 0    | 2     | 0   | 0    | 0                            | 0     | 0   | 0    | 0    | 0                            | 0   |  |  |  |
| 5:00 PM                        | 0    | 0    | 0     | 0   | 0                             | 0    | 0     | 0   | 0    | 0                            | 0     | 0   | 0    | 0    | 0                            | 0   |  |  |  |
| 5:15 PM                        | 0    | 0    | 0     | 0   | 0                             | 0    | 0     | 0   | 0    | 0                            | 0     | 0   | 0    | 0    | 0                            | 0   |  |  |  |
| 5:30 PM                        | 0    | 0    | 0     | 0   | 0                             | 0    | 0     | 0   | 0    | 0                            | 0     | 0   | 0    | 0    | 0                            | 0   |  |  |  |
| 5:45 PM                        | 0    | 0    | 0     | 0   | 0                             | 0    | 0     | 0   | 0    | 0                            | 0     | 0   | 0    | 0    | 0                            | 0   |  |  |  |

| AM PEAK HOUR<br>8:00 AM<br>to<br>9:00 AM | I-95 NB Off Ramp<br>Northbound |      |       |     | I-95 NB On Ramp<br>Southbound |      |       |     | Highland Avenue<br>Eastbound |      |       |     | Highland Avenue<br>Westbound |      |       |     |
|------------------------------------------|--------------------------------|------|-------|-----|-------------------------------|------|-------|-----|------------------------------|------|-------|-----|------------------------------|------|-------|-----|
|                                          | Left                           | Thru | Right | PED | Left                          | Thru | Right | PED | Left                         | Thru | Right | PED | Left                         | Thru | Right | PED |
|                                          | 0                              | 0    | 0     | 2   | 0                             | 0    | 0     | 0   | 0                            | 0    | 0     | 0   | 0                            | 0    | 0     | 0   |

| PM PEAK HOUR<br>5:00 PM<br>to<br>6:00 PM | I-95 NB Off Ramp<br>Northbound |      |       |     | I-95 NB On Ramp<br>Southbound |      |       |     | Highland Avenue<br>Eastbound |      |       |     | Highland Avenue<br>Westbound |      |       |     |
|------------------------------------------|--------------------------------|------|-------|-----|-------------------------------|------|-------|-----|------------------------------|------|-------|-----|------------------------------|------|-------|-----|
|                                          | Left                           | Thru | Right | PED | Left                          | Thru | Right | PED | Left                         | Thru | Right | PED | Left                         | Thru | Right | PED |
|                                          | 0                              | 0    | 0     | 0   | 0                             | 0    | 0     | 0   | 0                            | 0    | 0     | 0   | 0                            | 0    | 0     | 0   |

\* Peak hours corresponds to vehicular peak hours.

Client: Matthew Duranleau  
Project #: 168\_030\_VHB  
BTD #: Location 2  
Location: Needham, MA  
Street 1: Highland Avenue  
Street 2: I-95 NB On Ramp/ NB Off Ramp  
Count Date: 1/31/2018  
Day of Week: Wednesday  
Weather: Sun w/ Clouds, 30°F



**TOTAL (CARS & TRUCKS)**

| I-95 NB On Ramp Northbound |        |      |      | I-95 NB Off Ramp Southbound |        |      |      | Highland Avenue Eastbound |        |      |      | Highland Avenue Westbound |        |      |      |       |
|----------------------------|--------|------|------|-----------------------------|--------|------|------|---------------------------|--------|------|------|---------------------------|--------|------|------|-------|
| Start Time                 | U-Turn | Left | Thru | Right                       | U-Turn | Left | Thru | Right                     | U-Turn | Left | Thru | Right                     | U-Turn | Left | Thru | Right |
| 7:00 AM                    | 0      | 0    | 0    | 0                           | 0      | 0    | 0    | 33                        | 0      | 0    | 211  | 139                       | 0      | 0    | 97   | 0     |
| 7:15 AM                    | 0      | 0    | 0    | 0                           | 0      | 0    | 0    | 26                        | 0      | 0    | 242  | 128                       | 0      | 0    | 111  | 0     |
| 7:30 AM                    | 0      | 0    | 0    | 0                           | 0      | 0    | 0    | 22                        | 0      | 0    | 255  | 120                       | 0      | 0    | 123  | 0     |
| 7:45 AM                    | 0      | 0    | 0    | 0                           | 0      | 0    | 0    | 17                        | 0      | 0    | 286  | 107                       | 0      | 0    | 134  | 0     |
| 8:00 AM                    | 0      | 0    | 0    | 0                           | 0      | 0    | 0    | 20                        | 0      | 0    | 290  | 109                       | 0      | 0    | 139  | 0     |
| 8:15 AM                    | 0      | 0    | 0    | 0                           | 0      | 0    | 0    | 23                        | 0      | 0    | 326  | 106                       | 0      | 0    | 136  | 0     |
| 8:30 AM                    | 0      | 0    | 0    | 0                           | 0      | 0    | 0    | 22                        | 0      | 0    | 349  | 104                       | 0      | 0    | 134  | 0     |
| 8:45 AM                    | 0      | 0    | 0    | 0                           | 0      | 0    | 0    | 21                        | 0      | 0    | 339  | 102                       | 0      | 0    | 131  | 0     |

| I-95 NB On Ramp Northbound |        |      |      |       | I-95 NB Off Ramp Southbound |      |      |       |        | Highland Avenue Eastbound |      |       |        |      | Highland Avenue Westbound |       |  |  |  |
|----------------------------|--------|------|------|-------|-----------------------------|------|------|-------|--------|---------------------------|------|-------|--------|------|---------------------------|-------|--|--|--|
| Start Time                 | U-Turn | Left | Thru | Right | U-Turn                      | Left | Thru | Right | U-Turn | Left                      | Thru | Right | U-Turn | Left | Thru                      | Right |  |  |  |
| 4:00 PM                    | 0      | 0    | 0    | 0     | 0                           | 0    | 0    | 14    | 0      | 0                         | 163  | 117   | 0      | 0    | 186                       | 0     |  |  |  |
| 4:15 PM                    | 0      | 0    | 0    | 0     | 0                           | 0    | 0    | 18    | 0      | 0                         | 160  | 115   | 0      | 0    | 189                       | 0     |  |  |  |
| 4:30 PM                    | 0      | 0    | 0    | 0     | 0                           | 0    | 0    | 21    | 0      | 0                         | 140  | 116   | 0      | 0    | 185                       | 0     |  |  |  |
| 4:45 PM                    | 0      | 0    | 0    | 0     | 0                           | 0    | 0    | 23    | 0      | 0                         | 158  | 113   | 0      | 0    | 178                       | 0     |  |  |  |
| 5:00 PM                    | 0      | 0    | 0    | 0     | 0                           | 0    | 0    | 26    | 0      | 0                         | 176  | 99    | 0      | 0    | 217                       | 0     |  |  |  |
| 5:15 PM                    | 0      | 0    | 0    | 0     | 0                           | 0    | 0    | 27    | 0      | 0                         | 191  | 84    | 0      | 0    | 249                       | 0     |  |  |  |
| 5:30 PM                    | 0      | 0    | 0    | 0     | 0                           | 0    | 0    | 25    | 0      | 0                         | 183  | 83    | 0      | 0    | 251                       | 0     |  |  |  |
| 5:45 PM                    | 0      | 0    | 0    | 0     | 0                           | 0    | 0    | 24    | 0      | 0                         | 175  | 81    | 0      | 0    | 241                       | 0     |  |  |  |

| AM PEAK HOUR<br>8:00 AM<br>to<br>9:00 AM | I-95 NB On Ramp<br>Northbound |      |      |       | I-95 NB Off Ramp<br>Southbound |      |      |       | Highland Avenue<br>Eastbound |      |      |       | Highland Avenue<br>Westbound |      |      |       |
|------------------------------------------|-------------------------------|------|------|-------|--------------------------------|------|------|-------|------------------------------|------|------|-------|------------------------------|------|------|-------|
|                                          | U-Turn                        | Left | Thru | Right | U-Turn                         | Left | Thru | Right | U-Turn                       | Left | Thru | Right | U-Turn                       | Left | Thru | Right |
|                                          | 0                             | 0    | 0    | 0     | 0                              | 0    | 0    | 86    | 0                            | 0    | 1304 | 421   | 0                            | 0    | 540  | 0     |
| PHF                                      | 0.00                          |      |      |       | 0.93                           |      |      |       | 0.95                         |      |      |       | 0.97                         |      |      |       |
| HV %                                     | 0.0%                          | 0.0% | 0.0% | 0.0%  | 0.0%                           | 0.0% | 0.0% | 1.2%  | 0.0%                         | 0.0% | 1.2% | 0.7%  | 0.0%                         | 0.0% | 3.0% | 0.0%  |

| PM PEAK HOUR<br>5:00 PM<br>to<br>6:00 PM | I-95 NB On Ramp<br>Northbound |      |      |       | I-95 NB Off Ramp<br>Southbound |      |      |       | Highland Avenue<br>Eastbound |      |      |       | Highland Avenue<br>Westbound |      |      |       |
|------------------------------------------|-------------------------------|------|------|-------|--------------------------------|------|------|-------|------------------------------|------|------|-------|------------------------------|------|------|-------|
|                                          | U-Turn                        | Left | Thru | Right | U-Turn                         | Left | Thru | Right | U-Turn                       | Left | Thru | Right | U-Turn                       | Left | Thru | Right |
|                                          | 0                             | 0    | 0    | 0     | 0                              | 0    | 0    | 102   | 0                            | 0    | 725  | 347   | 0                            | 0    | 958  | 0     |
| PHF                                      | 0.00                          |      |      |       | 0.94                           |      |      |       | 0.97                         |      |      |       | 0.95                         |      |      |       |
| HV %                                     | 0.0%                          | 0.0% | 0.0% | 0.0%  | 0.0%                           | 0.0% | 0.0% | 1.0%  | 0.0%                         | 0.0% | 0.6% | 0.6%  | 0.0%                         | 0.0% | 0.5% | 0.0%  |

2/1/2018, 6:31 PM, 168\_030\_TMC\_Loc 2

Client: Matthew Duranleau  
Project #: 168\_030\_VHB  
BTD #: Location 2  
Location: Needham, MA  
Street 1: Highland Avenue  
Street 2: I-95 NB On Ramp/ NB Off Ramp  
Count Date: 1/31/2018  
Day of Week: Wednesday  
Weather: Sun w/ Clouds, 30°F



**TRUCKS**

| I-95 NB On Ramp Northbound |        |      |      | I-95 NB Off Ramp Southbound |        |      |      | Highland Avenue Eastbound |        |      |      | Highland Avenue Westbound |        |      |      |       |
|----------------------------|--------|------|------|-----------------------------|--------|------|------|---------------------------|--------|------|------|---------------------------|--------|------|------|-------|
| Start Time                 | U-Turn | Left | Thru | Right                       | U-Turn | Left | Thru | Right                     | U-Turn | Left | Thru | Right                     | U-Turn | Left | Thru | Right |
| 7:00 AM                    | 0      | 0    | 0    | 0                           | 0      | 0    | 0    | 0                         | 0      | 0    | 1    | 0                         | 0      | 0    | 4    | 0     |
| 7:15 AM                    | 0      | 0    | 0    | 0                           | 0      | 0    | 0    | 1                         | 0      | 0    | 5    | 1                         | 0      | 0    | 2    | 0     |
| 7:30 AM                    | 0      | 0    | 0    | 0                           | 0      | 0    | 0    | 4                         | 1      | 0    | 0    | 0                         | 0      | 0    | 4    | 0     |
| 7:45 AM                    | 0      | 0    | 0    | 0                           | 0      | 0    | 1    | 0                         | 0      | 3    | 2    | 0                         | 0      | 0    | 5    | 0     |
| 8:00 AM                    | 0      | 0    | 0    | 0                           | 0      | 0    | 0    | 0                         | 0      | 4    | 0    | 0                         | 0      | 0    | 5    | 0     |
| 8:15 AM                    | 0      | 0    | 0    | 0                           | 0      | 0    | 1    | 0                         | 0      | 3    | 1    | 0                         | 0      | 0    | 3    | 0     |
| 8:30 AM                    | 0      | 0    | 0    | 0                           | 0      | 0    | 0    | 0                         | 0      | 5    | 1    | 0                         | 0      | 0    | 4    | 0     |
| 8:45 AM                    | 0      | 0    | 0    | 0                           | 0      | 0    | 0    | 0                         | 0      | 4    | 1    | 0                         | 0      | 0    | 4    | 0     |

| I-95 NB On Ramp Northbound |        |      |      |       | I-95 NB Off Ramp Southbound |      |      |       |        | Highland Avenue Eastbound |      |       |        |      | Highland Avenue Westbound |       |  |  |  |
|----------------------------|--------|------|------|-------|-----------------------------|------|------|-------|--------|---------------------------|------|-------|--------|------|---------------------------|-------|--|--|--|
| Start Time                 | U-Turn | Left | Thru | Right | U-Turn                      | Left | Thru | Right | U-Turn | Left                      | Thru | Right | U-Turn | Left | Thru                      | Right |  |  |  |
| 4:00 PM                    | 0      | 0    | 0    | 0     | 0                           | 0    | 0    | 0     | 0      | 0                         | 1    | 0     | 0      | 0    | 4                         | 0     |  |  |  |
| 4:15 PM                    | 0      | 0    | 0    | 0     | 0                           | 0    | 0    | 0     | 0      | 4                         | 0    | 0     | 0      | 0    | 0                         | 0     |  |  |  |
| 4:30 PM                    | 0      | 0    | 0    | 0     | 0                           | 0    | 0    | 1     | 0      | 0                         | 4    | 1     | 0      | 0    | 0                         | 1     |  |  |  |
| 4:45 PM                    | 0      | 0    | 0    | 0     | 0                           | 0    | 0    | 0     | 0      | 0                         | 0    | 1     | 0      | 0    | 2                         | 0     |  |  |  |
| 5:00 PM                    | 0      | 0    | 0    | 0     | 0                           | 0    | 0    | 0     | 0      | 0                         | 1    | 0     | 0      | 0    | 3                         | 0     |  |  |  |
| 5:15 PM                    | 0      | 0    | 0    | 0     | 0                           | 0    | 0    | 0     | 1      | 0                         | 0    | 2     | 1      | 0    | 0                         | 0     |  |  |  |
| 5:30 PM                    | 0      | 0    | 0    | 0     | 0                           | 0    | 0    | 0     | 0      | 1                         | 1    | 1     | 0      | 0    | 1                         | 0     |  |  |  |
| 5:45 PM                    | 0      | 0    | 0    | 0     | 0                           | 0    | 0    | 0     | 0      | 0                         | 0    | 0     | 0      | 0    | 0                         | 1     |  |  |  |

| AM PEAK HOUR<br>7:15 AM to<br>8:15 AM | I-95 NB On Ramp Northbound |      |      |       | I-95 NB Off Ramp Southbound |      |      |       | Highland Avenue Eastbound |      |      |       | Highland Avenue Westbound |      |      |       |
|---------------------------------------|----------------------------|------|------|-------|-----------------------------|------|------|-------|---------------------------|------|------|-------|---------------------------|------|------|-------|
|                                       | U-Turn                     | Left | Thru | Right | U-Turn                      | Left | Thru | Right | U-Turn                    | Left | Thru | Right | U-Turn                    | Left | Thru | Right |
|                                       | 0                          | 0    | 0    | 0     | 0                           | 0    | 0    | 2     | 0                         | 0    | 16   | 4     | 0                         | 0    | 16   | 0     |
|                                       | 0.00                       |      |      |       | 0.50                        |      |      |       | 0.83                      |      |      |       | 0.80                      |      |      |       |
| PHF                                   |                            |      |      |       |                             |      |      |       |                           |      |      |       |                           |      |      |       |

| PM PEAK HOUR<br>4:00 PM<br>to<br>5:00 PM | I-95 NB On Ramp<br>Northbound |      |      |       | I-95 NB Off Ramp<br>Southbound |      |      |       | Highland Avenue<br>Eastbound |      |      |       | Highland Avenue<br>Westbound |      |      |       |
|------------------------------------------|-------------------------------|------|------|-------|--------------------------------|------|------|-------|------------------------------|------|------|-------|------------------------------|------|------|-------|
|                                          | U-Turn                        | Left | Thru | Right | U-Turn                         | Left | Thru | Right | U-Turn                       | Left | Thru | Right | U-Turn                       | Left | Thru | Right |
|                                          | 0                             | 0    | 0    | 0     | 0                              | 0    | 0    | 1     | 0                            | 0    | 9    | 2     | 0                            | 0    | 0    | 7     |
| PHF                                      | 0.00                          |      |      |       | 0.25                           |      |      |       | 0.55                         |      |      |       | 0.44                         |      |      |       |

2/1/2018, 6:31 PM, 168\_030\_TMC\_Loc 2



Client: Matthew Duranleau  
Project #: 168\_030\_VHB  
BTD #: Location 2  
Location: Needham, MA  
Street 1: Highland Avenue  
Street 2: I-95 NB On Ramp/ NB Off Ramp  
Count Date: 1/31/2018  
Day of Week: Wednesday  
Weather: Sun w/ Clouds, 30°F



PO BOX 1723, Framingham, MA 01701  
Office: 978-746-1299  
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PEDESTRIANS & BICYCLES

| I-95 NB On Ramp Northbound |      |      |       |     | I-95 NB Off Ramp Southbound |      |       |     |      | Highland Avenue Eastbound |       |     |      |      | Highland Avenue Westbound |     |  |  |  |
|----------------------------|------|------|-------|-----|-----------------------------|------|-------|-----|------|---------------------------|-------|-----|------|------|---------------------------|-----|--|--|--|
| Start Time                 | Left | Thru | Right | PED | Left                        | Thru | Right | PED | Left | Thru                      | Right | PED | Left | Thru | Right                     | PED |  |  |  |
| 7:00 AM                    | 0    | 0    | 0     | 0   | 0                           | 0    | 0     | 0   | 0    | 0                         | 0     | 0   | 0    | 0    | 0                         | 0   |  |  |  |
| 7:15 AM                    | 0    | 0    | 0     | 0   | 0                           | 0    | 0     | 0   | 0    | 1                         | 0     | 0   | 0    | 0    | 0                         | 0   |  |  |  |
| 7:30 AM                    | 0    | 0    | 0     | 0   | 0                           | 0    | 0     | 0   | 0    | 0                         | 0     | 0   | 0    | 0    | 0                         | 0   |  |  |  |
| 7:45 AM                    | 0    | 0    | 0     | 0   | 0                           | 0    | 0     | 0   | 0    | 0                         | 0     | 0   | 0    | 0    | 0                         | 0   |  |  |  |
| 8:00 AM                    | 0    | 0    | 1     | 0   | 0                           | 0    | 0     | 0   | 0    | 0                         | 0     | 0   | 0    | 0    | 0                         | 0   |  |  |  |
| 8:15 AM                    | 0    | 0    | 0     | 0   | 0                           | 0    | 0     | 0   | 0    | 0                         | 0     | 0   | 0    | 0    | 0                         | 0   |  |  |  |
| 8:30 AM                    | 0    | 0    | 0     | 0   | 0                           | 0    | 0     | 0   | 0    | 0                         | 0     | 0   | 0    | 0    | 0                         | 0   |  |  |  |
| 8:45 AM                    | 0    | 0    | 1     | 0   | 0                           | 0    | 0     | 0   | 0    | 0                         | 0     | 0   | 0    | 0    | 0                         | 0   |  |  |  |

| I-95 NB On Ramp Northbound |      |      |       |     | I-95 NB Off Ramp Southbound |      |       |     |      | Highland Avenue Eastbound |       |     |      |      | Highland Avenue Westbound |     |  |  |  |
|----------------------------|------|------|-------|-----|-----------------------------|------|-------|-----|------|---------------------------|-------|-----|------|------|---------------------------|-----|--|--|--|
| Start Time                 | Left | Thru | Right | PED | Left                        | Thru | Right | PED | Left | Thru                      | Right | PED | Left | Thru | Right                     | PED |  |  |  |
| 4:00 PM                    | 0    | 0    | 0     | 0   | 0                           | 0    | 0     | 1   | 0    | 0                         | 0     | 0   | 0    | 0    | 0                         | 0   |  |  |  |
| 4:15 PM                    | 0    | 0    | 0     | 0   | 0                           | 0    | 0     | 0   | 0    | 0                         | 0     | 0   | 0    | 0    | 0                         | 0   |  |  |  |
| 4:30 PM                    | 0    | 0    | 0     | 0   | 0                           | 0    | 0     | 1   | 0    | 0                         | 0     | 0   | 0    | 0    | 0                         | 0   |  |  |  |
| 4:45 PM                    | 0    | 0    | 0     | 0   | 0                           | 0    | 0     | 1   | 0    | 0                         | 0     | 0   | 0    | 0    | 0                         | 0   |  |  |  |
| 5:00 PM                    | 0    | 0    | 0     | 0   | 0                           | 0    | 0     | 1   | 0    | 0                         | 0     | 0   | 0    | 0    | 0                         | 0   |  |  |  |
| 5:15 PM                    | 0    | 0    | 0     | 0   | 0                           | 0    | 0     | 0   | 0    | 0                         | 0     | 0   | 0    | 0    | 0                         | 0   |  |  |  |
| 5:30 PM                    | 0    | 0    | 0     | 0   | 0                           | 0    | 0     | 0   | 0    | 0                         | 0     | 0   | 0    | 0    | 0                         | 0   |  |  |  |
| 5:45 PM                    | 0    | 0    | 0     | 0   | 0                           | 0    | 0     | 0   | 0    | 0                         | 0     | 0   | 0    | 0    | 0                         | 0   |  |  |  |

| AM PEAK HOUR<br>8:00 AM<br>to<br>9:00 AM | I-95 NB On Ramp<br>Northbound |      |       |     | I-95 NB Off Ramp<br>Southbound |      |       |     | Highland Avenue<br>Eastbound |      |       |     | Highland Avenue<br>Westbound |      |       |     |
|------------------------------------------|-------------------------------|------|-------|-----|--------------------------------|------|-------|-----|------------------------------|------|-------|-----|------------------------------|------|-------|-----|
|                                          | Left                          | Thru | Right | PED | Left                           | Thru | Right | PED | Left                         | Thru | Right | PED | Left                         | Thru | Right | PED |
|                                          | 0                             | 0    | 0     | 2   |                                | 0    | 0     | 0   | 0                            | 0    | 0     | 0   | 0                            | 0    | 0     | 0   |

| I-95 NB On Ramp<br>Northbound |      |      |       |     | I-95 NB Off Ramp<br>Southbound |      |       |     |      | Highland Avenue<br>Eastbound |       |     |      |      | Highland Avenue<br>Westbound |     |  |  |  |
|-------------------------------|------|------|-------|-----|--------------------------------|------|-------|-----|------|------------------------------|-------|-----|------|------|------------------------------|-----|--|--|--|
| 5:00 PM                       | Left | Thru | Right | PED | Left                           | Thru | Right | PED | Left | Thru                         | Right | PED | Left | Thru | Right                        | PED |  |  |  |
| to<br>6:00 PM                 | 0    | 0    | 0     | 0   | 0                              | 0    | 0     | 1   | 0    | 0                            | 0     | 0   | 0    | 0    | 0                            | 0   |  |  |  |

\* Peak hour corresponds to vehicular peak hours.

2/1/2018, 6:31 PM, 168\_030\_TMC\_Loc 2

Client: Matthew Duranleau  
Project #: 168\_030\_VHB  
BTD #: Location 3  
Location: Needham, MA  
Street 1: Highland Avenue  
Street 2: I-95 SB On Ramp/ SB Off Ramp  
Count Date: 1/31/2018  
Day of Week: Wednesday  
Weather: Sun w/ Clouds, 30°F



PO BOX 1723, Framingham, MA 01701  
Office: 978-746-1299  
Data@bostontrafficdata.com  
www.BostonTrafficData.com

TOTAL (CARS & TRUCKS)

| I-95 SB Off Ramp Northbound |        |      |      |       | I-95 SB On Ramp Southbound |      |      |       |        | Highland Avenue Eastbound |      |       |        |      | Highland Avenue Westbound |       |  |  |  |
|-----------------------------|--------|------|------|-------|----------------------------|------|------|-------|--------|---------------------------|------|-------|--------|------|---------------------------|-------|--|--|--|
| Start Time                  | U-Turn | Left | Thru | Right | U-Turn                     | Left | Thru | Right | U-Turn | Left                      | Thru | Right | U-Turn | Left | Thru                      | Right |  |  |  |
| 7:00 AM                     | 0      | 0    | 0    | 139   | 0                          | 0    | 0    | 0     | 0      | 0                         | 211  | 0     | 0      | 0    | 78                        | 52    |  |  |  |
| 7:15 AM                     | 0      | 0    | 0    | 125   | 0                          | 0    | 0    | 0     | 0      | 0                         | 245  | 0     | 0      | 0    | 81                        | 56    |  |  |  |
| 7:30 AM                     | 0      | 0    | 0    | 106   | 0                          | 0    | 0    | 0     | 0      | 0                         | 269  | 0     | 0      | 0    | 90                        | 55    |  |  |  |
| 7:45 AM                     | 0      | 0    | 0    | 129   | 0                          | 0    | 0    | 0     | 0      | 0                         | 264  | 0     | 0      | 0    | 96                        | 53    |  |  |  |
| 8:00 AM                     | 0      | 0    | 0    | 146   | 0                          | 0    | 0    | 0     | 0      | 0                         | 253  | 0     | 0      | 0    | 101                       | 58    |  |  |  |
| 8:15 AM                     | 0      | 0    | 0    | 172   | 0                          | 0    | 0    | 0     | 0      | 0                         | 260  | 0     | 0      | 0    | 99                        | 60    |  |  |  |
| 8:30 AM                     | 0      | 0    | 0    | 191   | 0                          | 0    | 0    | 0     | 0      | 0                         | 262  | 0     | 0      | 0    | 97                        | 59    |  |  |  |
| 8:45 AM                     | 0      | 0    | 0    | 187   | 0                          | 0    | 0    | 0     | 0      | 0                         | 254  | 0     | 0      | 0    | 95                        | 57    |  |  |  |

| I-95 SB Off Ramp Northbound |        |      |      |       | I-95 SB On Ramp Southbound |      |      |       |        | Highland Avenue Eastbound |      |       |        |      | Highland Avenue Westbound |       |  |  |  |
|-----------------------------|--------|------|------|-------|----------------------------|------|------|-------|--------|---------------------------|------|-------|--------|------|---------------------------|-------|--|--|--|
| Start Time                  | U-Turn | Left | Thru | Right | U-Turn                     | Left | Thru | Right | U-Turn | Left                      | Thru | Right | U-Turn | Left | Thru                      | Right |  |  |  |
| 4:00 PM                     | 0      | 0    | 0    | 49    | 0                          | 0    | 0    | 0     | 0      | 231                       | 0    | 0     | 0      | 0    | 144                       | 56    |  |  |  |
| 4:15 PM                     | 0      | 0    | 0    | 53    | 0                          | 0    | 0    | 0     | 0      | 222                       | 0    | 0     | 0      | 0    | 149                       | 58    |  |  |  |
| 4:30 PM                     | 0      | 0    | 0    | 52    | 0                          | 0    | 0    | 0     | 0      | 204                       | 0    | 0     | 0      | 0    | 143                       | 63    |  |  |  |
| 4:45 PM                     | 0      | 0    | 0    | 60    | 0                          | 0    | 0    | 0     | 0      | 211                       | 0    | 0     | 0      | 0    | 135                       | 66    |  |  |  |
| 5:00 PM                     | 0      | 0    | 0    | 66    | 0                          | 0    | 0    | 0     | 0      | 209                       | 0    | 0     | 0      | 0    | 151                       | 92    |  |  |  |
| 5:15 PM                     | 0      | 0    | 0    | 65    | 0                          | 0    | 0    | 0     | 0      | 210                       | 0    | 0     | 0      | 0    | 162                       | 114   |  |  |  |
| 5:30 PM                     | 0      | 0    | 0    | 63    | 0                          | 0    | 0    | 0     | 0      | 203                       | 0    | 0     | 0      | 0    | 163                       | 113   |  |  |  |
| 5:45 PM                     | 0      | 0    | 0    | 59    | 0                          | 0    | 0    | 0     | 0      | 197                       | 0    | 0     | 0      | 0    | 157                       | 108   |  |  |  |

| AM PEAK HOUR<br>8:00 AM<br>to<br>9:00 AM<br><br>PHF<br>HV % | I-95 SB Off Ramp<br>Northbound |      |      |       | I-95 SB On Ramp<br>Southbound |      |      |       | Highland Avenue<br>Eastbound |      |      |       | Highland Avenue<br>Westbound |      |      |       |
|-------------------------------------------------------------|--------------------------------|------|------|-------|-------------------------------|------|------|-------|------------------------------|------|------|-------|------------------------------|------|------|-------|
|                                                             | U-Turn                         | Left | Thru | Right | U-Turn                        | Left | Thru | Right | U-Turn                       | Left | Thru | Right | U-Turn                       | Left | Thru | Right |
|                                                             | 0                              | 0    | 0    | 696   | 0                             | 0    | 0    | 0     | 0                            | 0    | 1029 | 0     | 0                            | 0    | 392  | 234   |
|                                                             | 0.91                           |      |      |       | 0.00                          |      |      |       | 0.98                         |      |      |       | 0.98                         |      |      |       |
|                                                             | 0.0%                           | 0.0% | 0.0% | 1.7%  | 0.0%                          | 0.0% | 0.0% | 0.0%  | 0.0%                         | 0.0% | 0.7% | 0.0%  | 0.0%                         | 0.0% | 2.3% | 3.4%  |

| PM PEAK HOUR |               | I-95 SB Off Ramp Northbound |      |      |       | I-95 SB On Ramp Southbound |      |      |       | Highland Avenue Eastbound |      |      |       | Highland Avenue Westbound |      |      |       |
|--------------|---------------|-----------------------------|------|------|-------|----------------------------|------|------|-------|---------------------------|------|------|-------|---------------------------|------|------|-------|
| 5:00 PM      | to<br>6:00 PM | U-Turn                      | Left | Thru | Right | U-Turn                     | Left | Thru | Right | U-Turn                    | Left | Thru | Right | U-Turn                    | Left | Thru | Right |
|              |               | 0                           | 0    | 0    | 253   | 0                          | 0    | 0    | 0     | 0                         | 819  | 0    | 0     | 0                         | 633  | 427  |       |
| PHF          |               | 0.96                        |      |      |       | 0.00                       |      |      |       | 0.98                      |      |      |       | 0.96                      |      |      |       |
| HV %         |               | 0.0%                        | 0.0% | 0.0% | 1.6%  | 0.0%                       | 0.0% | 0.0% | 0.0%  | 0.0%                      | 0.0% | 0.2% | 0.0%  | 0.0%                      | 0.0% | 0.3% | 0.9%  |

2/1/2018, 6:38 PM, 168\_030\_TMC\_Loc 3

Client: Matthew Duranleau  
Project #: 168\_030\_VHB  
BTD #: Location 3  
Location: Needham, MA  
Street 1: Highland Avenue  
Street 2: I-95 SB On Ramp/ SB Off Ramp  
Count Date: 1/31/2018  
Day of Week: Wednesday  
Weather: Sun w/ Clouds, 30°F



#### TRUCKS

| I-95 SB Off Ramp<br>Northbound |        |      |      |       | I-95 SB On Ramp<br>Southbound |      |      |       |        | Highland Avenue<br>Eastbound |      |       |        |      | Highland Avenue<br>Westbound |       |  |  |  |
|--------------------------------|--------|------|------|-------|-------------------------------|------|------|-------|--------|------------------------------|------|-------|--------|------|------------------------------|-------|--|--|--|
| Start Time                     | U-Turn | Left | Thru | Right | U-Turn                        | Left | Thru | Right | U-Turn | Left                         | Thru | Right | U-Turn | Left | Thru                         | Right |  |  |  |
| 7:00 AM                        | 0      | 0    | 0    | 1     | 0                             | 0    | 0    | 0     | 0      | 0                            | 0    | 0     | 0      | 0    | 2                            | 2     |  |  |  |
| 7:15 AM                        | 0      | 0    | 0    | 5     | 0                             | 0    | 0    | 0     | 0      | 0                            | 1    | 0     | 0      | 0    | 1                            | 2     |  |  |  |
| 7:30 AM                        | 0      | 0    | 0    | 3     | 0                             | 0    | 0    | 0     | 0      | 2                            | 0    | 0     | 0      | 0    | 1                            | 3     |  |  |  |
| 7:45 AM                        | 0      | 0    | 0    | 4     | 0                             | 0    | 0    | 0     | 0      | 1                            | 0    | 0     | 0      | 0    | 5                            | 1     |  |  |  |
| 8:00 AM                        | 0      | 0    | 0    | 3     | 0                             | 0    | 0    | 0     | 0      | 1                            | 0    | 0     | 0      | 0    | 4                            | 1     |  |  |  |
| 8:15 AM                        | 0      | 0    | 0    | 2     | 0                             | 0    | 0    | 0     | 0      | 2                            | 0    | 0     | 0      | 0    | 2                            | 2     |  |  |  |
| 8:30 AM                        | 0      | 0    | 0    | 4     | 0                             | 0    | 0    | 0     | 0      | 2                            | 0    | 0     | 0      | 0    | 1                            | 3     |  |  |  |
| 8:45 AM                        | 0      | 0    | 0    | 3     | 0                             | 0    | 0    | 0     | 0      | 2                            | 0    | 0     | 0      | 0    | 2                            | 2     |  |  |  |

| I-95 SB Off Ramp<br>Northbound |        |      |      |       | I-95 SB On Ramp<br>Southbound |      |      |       |        | Highland Avenue<br>Eastbound |      |       |        |      | Highland Avenue<br>Westbound |       |  |  |  |
|--------------------------------|--------|------|------|-------|-------------------------------|------|------|-------|--------|------------------------------|------|-------|--------|------|------------------------------|-------|--|--|--|
| Start Time                     | U-Turn | Left | Thru | Right | U-Turn                        | Left | Thru | Right | U-Turn | Left                         | Thru | Right | U-Turn | Left | Thru                         | Right |  |  |  |
| 4:00 PM                        | 0      | 0    | 0    | 0     | 0                             | 0    | 0    | 0     | 0      | 1                            | 0    | 0     | 0      | 0    | 1                            | 3     |  |  |  |
| 4:15 PM                        | 0      | 0    | 0    | 3     | 0                             | 0    | 0    | 0     | 0      | 1                            | 0    | 0     | 0      | 0    | 0                            | 0     |  |  |  |
| 4:30 PM                        | 0      | 0    | 0    | 2     | 0                             | 0    | 0    | 0     | 0      | 3                            | 0    | 0     | 0      | 0    | 1                            | 1     |  |  |  |
| 4:45 PM                        | 0      | 0    | 0    | 0     | 0                             | 0    | 0    | 0     | 0      | 1                            | 0    | 0     | 0      | 0    | 0                            | 2     |  |  |  |
| 5:00 PM                        | 0      | 0    | 0    | 1     | 0                             | 0    | 0    | 0     | 0      | 0                            | 0    | 0     | 0      | 0    | 1                            | 2     |  |  |  |
| 5:15 PM                        | 0      | 0    | 0    | 2     | 0                             | 0    | 0    | 0     | 0      | 1                            | 0    | 0     | 0      | 0    | 0                            | 1     |  |  |  |
| 5:30 PM                        | 0      | 0    | 0    | 1     | 0                             | 0    | 0    | 0     | 0      | 1                            | 0    | 0     | 0      | 0    | 1                            | 0     |  |  |  |
| 5:45 PM                        | 0      | 0    | 0    | 0     | 0                             | 0    | 0    | 0     | 0      | 0                            | 0    | 0     | 0      | 0    | 0                            | 1     |  |  |  |

| AM PEAK HOUR<br>7:15 AM<br>to<br>8:15 AM<br><br>PHF | I-95 SB Off Ramp<br>Northbound |      |      |       | I-95 SB On Ramp<br>Southbound |      |      |       | Highland Avenue<br>Eastbound |      |      |       | Highland Avenue<br>Westbound |      |      |       |
|-----------------------------------------------------|--------------------------------|------|------|-------|-------------------------------|------|------|-------|------------------------------|------|------|-------|------------------------------|------|------|-------|
|                                                     | U-Turn                         | Left | Thru | Right | U-Turn                        | Left | Thru | Right | U-Turn                       | Left | Thru | Right | U-Turn                       | Left | Thru | Right |
|                                                     | 0                              | 0    | 0    | 15    | 0                             | 0    | 0    | 0     | 0                            | 0    | 5    | 0     | 0                            | 0    | 11   | 7     |
|                                                     | 0.75                           |      |      |       | 0.00                          |      |      |       | 0.63                         |      |      |       | 0.75                         |      |      |       |

| PM PEAK HOUR<br>4:00 PM<br>to<br>5:00 PM<br><br>PHF | I-95 SB Off Ramp<br>Northbound |      |      |       | I-95 SB On Ramp<br>Southbound |      |      |       | Highland Avenue<br>Eastbound |      |      |       | Highland Avenue<br>Westbound |      |      |       |
|-----------------------------------------------------|--------------------------------|------|------|-------|-------------------------------|------|------|-------|------------------------------|------|------|-------|------------------------------|------|------|-------|
|                                                     | U-Turn                         | Left | Thru | Right | U-Turn                        | Left | Thru | Right | U-Turn                       | Left | Thru | Right | U-Turn                       | Left | Thru | Right |
|                                                     | 0                              | 0    | 0    | 5     | 0                             | 0    | 0    | 0     | 0                            | 0    | 6    | 0     | 0                            | 0    | 2    | 6     |
|                                                     | 0.42                           |      |      |       | 0.00                          |      |      |       | 0.50                         |      |      |       | 0.50                         |      |      |       |

Client: Matthew Duranleau  
Project #: 168\_030\_VHB  
BTD #: Location 3  
Location: Needham, MA  
Street 1: Highland Avenue  
Street 2: I-95 SB On Ramp/ SB Off Ramp  
Count Date: 1/31/2018  
Day of Week: Wednesday  
Weather: Sun w/ Clouds, 30°F



#### PEDESTRIANS & BICYCLES

| I-95 SB Off Ramp<br>Northbound |      |      |       |     | I-95 SB On Ramp<br>Southbound |      |       |     |      | Highland Avenue<br>Eastbound |       |     |      |      | Highland Avenue<br>Westbound |     |  |  |  |
|--------------------------------|------|------|-------|-----|-------------------------------|------|-------|-----|------|------------------------------|-------|-----|------|------|------------------------------|-----|--|--|--|
| Start Time                     | Left | Thru | Right | PED | Left                          | Thru | Right | PED | Left | Thru                         | Right | PED | Left | Thru | Right                        | PED |  |  |  |
| 7:00 AM                        | 0    | 0    | 0     | 0   | 0                             | 0    | 0     | 0   | 0    | 0                            | 0     | 0   | 0    | 0    | 0                            | 0   |  |  |  |
| 7:15 AM                        | 0    | 0    | 0     | 0   | 0                             | 0    | 0     | 0   | 0    | 1                            | 0     | 0   | 0    | 0    | 0                            | 0   |  |  |  |
| 7:30 AM                        | 0    | 0    | 0     | 0   | 0                             | 0    | 0     | 0   | 0    | 0                            | 0     | 0   | 0    | 0    | 0                            | 0   |  |  |  |
| 7:45 AM                        | 0    | 0    | 0     | 1   | 0                             | 0    | 0     | 0   | 0    | 0                            | 0     | 0   | 0    | 0    | 0                            | 0   |  |  |  |
| 8:00 AM                        | 0    | 0    | 0     | 0   | 0                             | 0    | 0     | 0   | 0    | 0                            | 0     | 0   | 0    | 0    | 0                            | 0   |  |  |  |
| 8:15 AM                        | 0    | 0    | 0     | 0   | 0                             | 0    | 0     | 0   | 0    | 0                            | 0     | 0   | 0    | 0    | 0                            | 0   |  |  |  |
| 8:30 AM                        | 0    | 0    | 0     | 0   | 0                             | 0    | 0     | 0   | 0    | 0                            | 0     | 0   | 0    | 0    | 0                            | 0   |  |  |  |
| 8:45 AM                        | 0    | 0    | 0     | 1   | 0                             | 0    | 0     | 0   | 0    | 0                            | 0     | 0   | 0    | 0    | 0                            | 0   |  |  |  |

| I-95 SB Off Ramp<br>Northbound |      |      |       |     | I-95 SB On Ramp<br>Southbound |      |       |     |      | Highland Avenue<br>Eastbound |       |     |      |      | Highland Avenue<br>Westbound |     |  |  |  |
|--------------------------------|------|------|-------|-----|-------------------------------|------|-------|-----|------|------------------------------|-------|-----|------|------|------------------------------|-----|--|--|--|
| Start Time                     | Left | Thru | Right | PED | Left                          | Thru | Right | PED | Left | Thru                         | Right | PED | Left | Thru | Right                        | PED |  |  |  |
| 4:00 PM                        | 0    | 0    | 0     | 0   | 0                             | 0    | 0     | 0   | 0    | 0                            | 0     | 0   | 0    | 0    | 0                            | 0   |  |  |  |
| 4:15 PM                        | 0    | 0    | 0     | 0   | 0                             | 0    | 0     | 1   | 0    | 0                            | 0     | 0   | 0    | 0    | 0                            | 0   |  |  |  |
| 4:30 PM                        | 0    | 0    | 0     | 0   | 0                             | 0    | 0     | 1   | 0    | 0                            | 0     | 0   | 0    | 0    | 0                            | 0   |  |  |  |
| 4:45 PM                        | 0    | 0    | 0     | 0   | 0                             | 0    | 0     | 0   | 0    | 0                            | 0     | 0   | 0    | 0    | 0                            | 0   |  |  |  |
| 5:00 PM                        | 0    | 0    | 0     | 0   | 0                             | 0    | 0     | 2   | 0    | 0                            | 0     | 0   | 0    | 0    | 0                            | 0   |  |  |  |
| 5:15 PM                        | 0    | 0    | 0     | 0   | 0                             | 0    | 0     | 0   | 0    | 0                            | 0     | 0   | 0    | 0    | 0                            | 0   |  |  |  |
| 5:30 PM                        | 0    | 0    | 0     | 0   | 0                             | 0    | 0     | 0   | 0    | 0                            | 0     | 0   | 0    | 0    | 0                            | 0   |  |  |  |
| 5:45 PM                        | 0    | 0    | 0     | 0   | 0                             | 0    | 0     | 0   | 0    | 0                            | 0     | 0   | 0    | 0    | 0                            | 0   |  |  |  |

| AM PEAK HOUR<br>8:00 AM<br>to<br>9:00 AM | I-95 SB Off Ramp<br>Northbound |      |       |     | I-95 SB On Ramp<br>Southbound |      |       |     | Highland Avenue<br>Eastbound |      |       |     | Highland Avenue<br>Westbound |      |       |     |
|------------------------------------------|--------------------------------|------|-------|-----|-------------------------------|------|-------|-----|------------------------------|------|-------|-----|------------------------------|------|-------|-----|
|                                          | Left                           | Thru | Right | PED | Left                          | Thru | Right | PED | Left                         | Thru | Right | PED | Left                         | Thru | Right | PED |
|                                          | 0                              | 0    | 0     | 1   | 0                             | 0    | 0     | 0   | 0                            | 0    | 0     | 0   | 0                            | 0    | 0     | 0   |

| I-95 SB Off Ramp<br>Northbound           |      |      |       | I-95 SB On Ramp<br>Southbound |      |      |       | Highland Avenue<br>Eastbound |      |      |       | Highland Avenue<br>Westbound |      |      |       |     |
|------------------------------------------|------|------|-------|-------------------------------|------|------|-------|------------------------------|------|------|-------|------------------------------|------|------|-------|-----|
| PM PEAK HOUR<br>5:00 PM<br>to<br>6:00 PM | Left | Thru | Right | PED                           | Left | Thru | Right | PED                          | Left | Thru | Right | PED                          | Left | Thru | Right | PED |
|                                          | 0    | 0    | 0     | 0                             | 0    | 0    | 0     | 2                            | 0    | 0    | 0     | 0                            | 0    | 0    | 0     | 0   |

\* Peak hours corresponds to vehicular peak hours.

Client: Matthew Duranleau  
Project #: 168\_030\_VHB  
BTD #: Location 4  
Location: Needham, MA  
Street 1: Highland Avenue  
Street 2: I-95 SB On Ramp/ SB Off Ramp  
Count Date: 1/31/2018  
Day of Week: Wednesday  
Weather: Sun w/ Clouds, 30°F



**TOTAL (CARS & TRUCKS)**

| I-95 SB On Ramp<br>Northbound |        |      |      | I-95 SB Off Ramp<br>Southbound |        |      |      | Highland Avenue<br>Eastbound |        |      |      | Highland Avenue<br>Westbound |        |      |      |       |
|-------------------------------|--------|------|------|--------------------------------|--------|------|------|------------------------------|--------|------|------|------------------------------|--------|------|------|-------|
| Start Time                    | U-Turn | Left | Thru | Right                          | U-Turn | Left | Thru | Right                        | U-Turn | Left | Thru | Right                        | U-Turn | Left | Thru | Right |
| 7:00 AM                       | 0      | 0    | 0    | 0                              | 0      | 0    | 0    | 105                          | 0      | 0    | 213  | 25                           | 0      | 0    | 79   | 0     |
| 7:15 AM                       | 0      | 0    | 0    | 0                              | 0      | 0    | 0    | 111                          | 0      | 0    | 244  | 29                           | 0      | 0    | 83   | 0     |
| 7:30 AM                       | 0      | 0    | 0    | 0                              | 0      | 0    | 0    | 112                          | 0      | 0    | 268  | 31                           | 0      | 0    | 89   | 0     |
| 7:45 AM                       | 0      | 0    | 0    | 0                              | 0      | 0    | 0    | 119                          | 0      | 0    | 266  | 28                           | 0      | 0    | 97   | 0     |
| 8:00 AM                       | 0      | 0    | 0    | 0                              | 0      | 0    | 0    | 121                          | 0      | 0    | 254  | 23                           | 0      | 0    | 102  | 0     |
| 8:15 AM                       | 0      | 0    | 0    | 0                              | 0      | 0    | 0    | 124                          | 0      | 0    | 259  | 27                           | 0      | 0    | 98   | 0     |
| 8:30 AM                       | 0      | 0    | 0    | 0                              | 0      | 0    | 0    | 126                          | 0      | 0    | 263  | 28                           | 0      | 0    | 99   | 0     |
| 8:45 AM                       | 0      | 0    | 0    | 0                              | 0      | 0    | 0    | 122                          | 0      | 0    | 256  | 26                           | 0      | 0    | 94   | 0     |

| I-95 SB On Ramp<br>Northbound |        |      |      |       | I-95 SB Off Ramp<br>Southbound |      |      |       |        | Highland Avenue<br>Eastbound |      |       |        |      | Highland Avenue<br>Westbound |       |  |  |  |
|-------------------------------|--------|------|------|-------|--------------------------------|------|------|-------|--------|------------------------------|------|-------|--------|------|------------------------------|-------|--|--|--|
| Start Time                    | U-Turn | Left | Thru | Right | U-Turn                         | Left | Thru | Right | U-Turn | Left                         | Thru | Right | U-Turn | Left | Thru                         | Right |  |  |  |
| 4:00 PM                       | 0      | 0    | 0    | 0     | 0                              | 0    | 0    | 54    | 0      | 0                            | 229  | 47    | 0      | 0    | 142                          | 0     |  |  |  |
| 4:15 PM                       | 0      | 0    | 0    | 0     | 0                              | 0    | 0    | 64    | 0      | 0                            | 223  | 40    | 0      | 0    | 148                          | 0     |  |  |  |
| 4:30 PM                       | 0      | 0    | 0    | 0     | 0                              | 0    | 0    | 71    | 0      | 0                            | 207  | 49    | 0      | 0    | 144                          | 0     |  |  |  |
| 4:45 PM                       | 0      | 0    | 0    | 0     | 0                              | 0    | 0    | 92    | 0      | 0                            | 209  | 57    | 0      | 0    | 139                          | 0     |  |  |  |
| 5:00 PM                       | 0      | 0    | 0    | 0     | 0                              | 0    | 0    | 109   | 0      | 0                            | 210  | 63    | 0      | 0    | 149                          | 0     |  |  |  |
| 5:15 PM                       | 0      | 0    | 0    | 0     | 0                              | 0    | 0    | 104   | 0      | 0                            | 212  | 62    | 0      | 0    | 161                          | 0     |  |  |  |
| 5:30 PM                       | 0      | 0    | 0    | 0     | 0                              | 0    | 0    | 95    | 0      | 0                            | 204  | 58    | 0      | 0    | 164                          | 0     |  |  |  |
| 5:45 PM                       | 0      | 0    | 0    | 0     | 0                              | 0    | 0    | 92    | 0      | 0                            | 196  | 56    | 0      | 0    | 155                          | 0     |  |  |  |

| AM PEAK HOUR             | I-95 SB On Ramp<br>Northbound |      |      |       | I-95 SB Off Ramp<br>Southbound |      |      |       | Highland Avenue<br>Eastbound |      |      |       | Highland Avenue<br>Westbound |      |      |       |
|--------------------------|-------------------------------|------|------|-------|--------------------------------|------|------|-------|------------------------------|------|------|-------|------------------------------|------|------|-------|
| 7:45 AM<br>to<br>8:45 AM | U-Turn                        | Left | Thru | Right | U-Turn                         | Left | Thru | Right | U-Turn                       | Left | Thru | Right | U-Turn                       | Left | Thru | Right |
|                          | 0                             | 0    | 0    | 0     | 0                              | 0    | 0    | 490   | 0                            | 0    | 1042 | 106   | 0                            | 0    | 396  | 0     |
| PHF                      | 0.00                          |      |      |       | 0.97                           |      |      |       | 0.98                         |      |      |       | 0.97                         |      |      |       |
| HV %                     | 0.0%                          | 0.0% | 0.0% | 0.0%  | 0.0%                           | 0.0% | 0.0% | 2.4%  | 0.0%                         | 0.0% | 0.6% | 5.7%  | 0.0%                         | 0.0% | 3.0% | 0.0%  |

| PM PEAK HOUR             | I-95 SB On Ramp<br>Northbound |      |      |       | I-95 SB Off Ramp<br>Southbound |      |      |       | Highland Avenue<br>Eastbound |      |      |       | Highland Avenue<br>Westbound |      |      |       |
|--------------------------|-------------------------------|------|------|-------|--------------------------------|------|------|-------|------------------------------|------|------|-------|------------------------------|------|------|-------|
| 5:00 PM<br>to<br>6:00 PM | U-Turn                        | Left | Thru | Right | U-Turn                         | Left | Thru | Right | U-Turn                       | Left | Thru | Right | U-Turn                       | Left | Thru | Right |
|                          | 0                             | 0    | 0    | 0     | 0                              | 0    | 0    | 400   | 0                            | 0    | 822  | 239   | 0                            | 0    | 629  | 0     |
| PHF                      | 0.00                          |      |      |       | 0.92                           |      |      |       | 0.97                         |      |      |       | 0.96                         |      |      |       |
| HV %                     | 0.0%                          | 0.0% | 0.0% | 0.0%  | 0.0%                           | 0.0% | 0.0% | 0.3%  | 0.0%                         | 0.0% | 0.2% | 0.8%  | 0.0%                         | 0.0% | 0.3% | 0.0%  |

2/1/2018, 7:25 PM, 168\_030\_TMC\_Loc 4

Client: Matthew Duranleau  
Project #: 168\_030\_VHB  
BTD #: Location 4  
Location: Needham, MA  
Street 1: Highland Avenue  
Street 2: I-95 SB On Ramp/ SB Off Ramp  
Count Date: 1/31/2018  
Day of Week: Wednesday  
Weather: Sun w/ Clouds, 30°F



**TRUCKS**

| I-95 SB On Ramp<br>Northbound |        |      |      |       | I-95 SB Off Ramp<br>Southbound |      |      |       |        | Highland Avenue<br>Eastbound |      |       |        |      | Highland Avenue<br>Westbound |       |  |  |  |
|-------------------------------|--------|------|------|-------|--------------------------------|------|------|-------|--------|------------------------------|------|-------|--------|------|------------------------------|-------|--|--|--|
| Start Time                    | U-Turn | Left | Thru | Right | U-Turn                         | Left | Thru | Right | U-Turn | Left                         | Thru | Right | U-Turn | Left | Thru                         | Right |  |  |  |
| 7:00 AM                       | 0      | 0    | 0    | 0     | 0                              | 0    | 0    | 1     | 0      | 0                            | 0    | 0     | 0      | 0    | 2                            | 0     |  |  |  |
| 7:15 AM                       | 0      | 0    | 0    | 0     | 0                              | 0    | 0    | 5     | 0      | 0                            | 1    | 0     | 0      | 0    | 1                            | 0     |  |  |  |
| 7:30 AM                       | 0      | 0    | 0    | 0     | 0                              | 0    | 0    | 2     | 0      | 0                            | 2    | 3     | 0      | 0    | 1                            | 0     |  |  |  |
| 7:45 AM                       | 0      | 0    | 0    | 0     | 0                              | 0    | 0    | 5     | 0      | 0                            | 1    | 2     | 0      | 0    | 5                            | 0     |  |  |  |
| 8:00 AM                       | 0      | 0    | 0    | 0     | 0                              | 0    | 0    | 2     | 0      | 0                            | 2    | 1     | 0      | 0    | 4                            | 0     |  |  |  |
| 8:15 AM                       | 0      | 0    | 0    | 0     | 0                              | 0    | 0    | 3     | 0      | 0                            | 2    | 2     | 0      | 0    | 2                            | 0     |  |  |  |
| 8:30 AM                       | 0      | 0    | 0    | 0     | 0                              | 0    | 0    | 2     | 0      | 0                            | 1    | 1     | 0      | 0    | 1                            | 0     |  |  |  |
| 8:45 AM                       | 0      | 0    | 0    | 0     | 0                              | 0    | 0    | 1     | 0      | 0                            | 2    | 1     | 0      | 0    | 2                            | 0     |  |  |  |

| I-95 SB On Ramp<br>Northbound |        |      |      | I-95 SB Off Ramp<br>Southbound |        |      |      | Highland Avenue<br>Eastbound |        |      |      | Highland Avenue<br>Westbound |        |      |      |       |
|-------------------------------|--------|------|------|--------------------------------|--------|------|------|------------------------------|--------|------|------|------------------------------|--------|------|------|-------|
| Start Time                    | U-Turn | Left | Thru | Right                          | U-Turn | Left | Thru | Right                        | U-Turn | Left | Thru | Right                        | U-Turn | Left | Thru | Right |
| 4:00 PM                       | 0      | 0    | 0    | 0                              | 0      | 0    | 0    | 0                            | 0      | 0    | 1    | 1                            | 0      | 0    | 1    | 0     |
| 4:15 PM                       | 0      | 0    | 0    | 0                              | 0      | 0    | 0    | 1                            | 0      | 0    | 2    | 0                            | 0      | 0    | 0    | 0     |
| 4:30 PM                       | 0      | 0    | 0    | 0                              | 0      | 0    | 0    | 0                            | 0      | 0    | 2    | 1                            | 0      | 0    | 1    | 0     |
| 4:45 PM                       | 0      | 0    | 0    | 0                              | 0      | 0    | 0    | 1                            | 0      | 0    | 1    | 0                            | 0      | 0    | 0    | 0     |
| 5:00 PM                       | 0      | 0    | 0    | 0                              | 0      | 0    | 0    | 0                            | 0      | 0    | 0    | 1                            | 0      | 0    | 1    | 0     |
| 5:15 PM                       | 0      | 0    | 0    | 0                              | 0      | 0    | 0    | 0                            | 0      | 0    | 1    | 1                            | 0      | 0    | 0    | 0     |
| 5:30 PM                       | 0      | 0    | 0    | 0                              | 0      | 0    | 0    | 1                            | 0      | 0    | 1    | 0                            | 0      | 0    | 1    | 0     |
| 5:45 PM                       | 0      | 0    | 0    | 0                              | 0      | 0    | 0    | 0                            | 0      | 0    | 0    | 0                            | 0      | 0    | 0    | 0     |

| AM PEAK HOUR             |        | I-95 SB On Ramp<br>Northbound |      |       |        | I-95 SB Off Ramp<br>Southbound |      |       |        | Highland Avenue<br>Eastbound |      |       |        | Highland Avenue<br>Westbound |      |       |  |
|--------------------------|--------|-------------------------------|------|-------|--------|--------------------------------|------|-------|--------|------------------------------|------|-------|--------|------------------------------|------|-------|--|
| 7:30 AM<br>to<br>8:30 AM | U-Turn | Left                          | Thru | Right | U-Turn | Left                           | Thru | Right | U-Turn | Left                         | Thru | Right | U-Turn | Left                         | Thru | Right |  |
| PHF                      | 0      | 0                             | 0    | 0     | 0      | 0                              | 0    | 12    | 0      | 0                            | 7    | 8     | 0      | 0                            | 12   | 0     |  |
|                          | 0.00   |                               |      |       |        | 0.60                           |      |       |        | 0.75                         |      |       |        | 0.60                         |      |       |  |

| PM PEAK HOUR<br>4:00 PM<br>to<br>5:00 PM<br>PHF | I-95 SB On Ramp<br>Northbound |      |      |       | I-95 SB Off Ramp<br>Southbound |      |      |       | Highland Avenue<br>Eastbound |      |      |       | Highland Avenue<br>Westbound |      |      |       |
|-------------------------------------------------|-------------------------------|------|------|-------|--------------------------------|------|------|-------|------------------------------|------|------|-------|------------------------------|------|------|-------|
|                                                 | U-Turn                        | Left | Thru | Right | U-Turn                         | Left | Thru | Right | U-Turn                       | Left | Thru | Right | U-Turn                       | Left | Thru | Right |
|                                                 | 0                             | 0    | 0    | 0     | 0                              | 0    | 0    | 2     | 0                            | 0    | 5    | 2     | 0                            | 0    | 2    | 0     |
|                                                 | 0.00                          |      |      |       | 0.50                           |      |      |       | 0.67                         |      |      |       | 0.50                         |      |      |       |

2/1/2018, 7:25 PM, 168\_030\_TMC\_Loc 4

Client: Matthew Duranleau  
Project #: 168\_030\_VHB  
BTD #: Location 4  
Location: Needham, MA  
Street 1: Highland Avenue  
Street 2: I-95 SB On Ramp/ SB Off Ramp  
Count Date: 1/31/2018  
Day of Week: Wednesday  
Weather: Sun w/ Clouds, 30°F



PEDESTRIANS & BICYCLES

| I-95 SB On Ramp<br>Northbound |      |      |       |     | I-95 SB Off Ramp<br>Southbound |      |       |     |      | Highland Avenue<br>Eastbound |       |     |      |      | Highland Avenue<br>Westbound |     |  |  |  |
|-------------------------------|------|------|-------|-----|--------------------------------|------|-------|-----|------|------------------------------|-------|-----|------|------|------------------------------|-----|--|--|--|
| Start Time                    | Left | Thru | Right | PED | Left                           | Thru | Right | PED | Left | Thru                         | Right | PED | Left | Thru | Right                        | PED |  |  |  |
| 7:00 AM                       | 0    | 0    | 0     | 0   | 0                              | 0    | 0     | 0   | 0    | 0                            | 0     | 0   | 0    | 0    | 0                            | 0   |  |  |  |
| 7:15 AM                       | 0    | 0    | 0     | 0   | 0                              | 0    | 0     | 0   | 0    | 1                            | 0     | 0   | 0    | 0    | 0                            | 0   |  |  |  |
| 7:30 AM                       | 0    | 0    | 0     | 0   | 0                              | 0    | 0     | 0   | 0    | 0                            | 0     | 0   | 0    | 0    | 0                            | 0   |  |  |  |
| 7:45 AM                       | 0    | 0    | 0     | 1   | 0                              | 0    | 0     | 0   | 0    | 0                            | 0     | 0   | 0    | 0    | 0                            | 0   |  |  |  |
| 8:00 AM                       | 0    | 0    | 0     | 0   | 0                              | 0    | 0     | 0   | 0    | 0                            | 0     | 0   | 0    | 0    | 0                            | 0   |  |  |  |
| 8:15 AM                       | 0    | 0    | 0     | 0   | 0                              | 0    | 0     | 0   | 0    | 0                            | 0     | 0   | 0    | 0    | 0                            | 0   |  |  |  |
| 8:30 AM                       | 0    | 0    | 0     | 0   | 0                              | 0    | 0     | 0   | 0    | 0                            | 0     | 0   | 0    | 0    | 0                            | 0   |  |  |  |
| 8:45 AM                       | 0    | 0    | 0     | 1   | 0                              | 0    | 0     | 0   | 0    | 0                            | 0     | 0   | 0    | 0    | 0                            | 0   |  |  |  |

| I-95 SB On Ramp Northbound |      |      |       |     | I-95 SB Off Ramp Southbound |      |       |     |      | Highland Avenue Eastbound |       |     |      |      | Highland Avenue Westbound |     |  |  |  |
|----------------------------|------|------|-------|-----|-----------------------------|------|-------|-----|------|---------------------------|-------|-----|------|------|---------------------------|-----|--|--|--|
| Start Time                 | Left | Thru | Right | PED | Left                        | Thru | Right | PED | Left | Thru                      | Right | PED | Left | Thru | Right                     | PED |  |  |  |
| 4:00 PM                    | 0    | 0    | 0     | 0   | 0                           | 0    | 0     | 0   | 0    | 0                         | 0     | 0   | 0    | 0    | 0                         | 0   |  |  |  |
| 4:15 PM                    | 0    | 0    | 0     | 0   | 0                           | 0    | 0     | 1   | 0    | 0                         | 0     | 0   | 0    | 0    | 0                         | 0   |  |  |  |
| 4:30 PM                    | 0    | 0    | 0     | 0   | 0                           | 0    | 1     | 1   | 0    | 0                         | 0     | 0   | 0    | 1    | 0                         | 0   |  |  |  |
| 4:45 PM                    | 0    | 0    | 0     | 0   | 0                           | 0    | 0     | 0   | 0    | 0                         | 0     | 0   | 0    | 0    | 0                         | 0   |  |  |  |
| 5:00 PM                    | 0    | 0    | 0     | 0   | 0                           | 0    | 0     | 1   | 0    | 0                         | 0     | 0   | 0    | 0    | 0                         | 0   |  |  |  |
| 5:15 PM                    | 0    | 0    | 0     | 0   | 0                           | 0    | 0     | 1   | 0    | 0                         | 0     | 0   | 0    | 0    | 0                         | 0   |  |  |  |
| 5:30 PM                    | 0    | 0    | 0     | 0   | 0                           | 0    | 0     | 0   | 0    | 0                         | 0     | 0   | 0    | 0    | 0                         | 0   |  |  |  |
| 5:45 PM                    | 0    | 0    | 0     | 0   | 0                           | 0    | 0     | 0   | 0    | 0                         | 0     | 0   | 0    | 0    | 0                         | 0   |  |  |  |

| AM PEAK HOUR<br>7:45 AM<br>to<br>8:45 AM | I-95 SB On Ramp<br>Northbound |      |       |     | I-95 SB Off Ramp<br>Southbound |      |       |     | Highland Avenue<br>Eastbound |      |       |     | Highland Avenue<br>Westbound |      |       |     |
|------------------------------------------|-------------------------------|------|-------|-----|--------------------------------|------|-------|-----|------------------------------|------|-------|-----|------------------------------|------|-------|-----|
|                                          | Left                          | Thru | Right | PED | Left                           | Thru | Right | PED | Left                         | Thru | Right | PED | Left                         | Thru | Right | PED |
|                                          | 0                             | 0    | 0     | 1   | 0                              | 0    | 0     | 0   | 0                            | 0    | 0     | 0   | 0                            | 0    | 0     | 0   |

| PM PEAK HOUR<br>5:00 PM<br>to<br>6:00 PM | I-95 SB On Ramp<br>Northbound |      |       |     | I-95 SB Off Ramp<br>Southbound |      |       |     | Highland Avenue<br>Eastbound |      |       |     | Highland Avenue<br>Westbound |      |       |     |
|------------------------------------------|-------------------------------|------|-------|-----|--------------------------------|------|-------|-----|------------------------------|------|-------|-----|------------------------------|------|-------|-----|
|                                          | Left                          | Thru | Right | PED | Left                           | Thru | Right | PED | Left                         | Thru | Right | PED | Left                         | Thru | Right | PED |
|                                          | 0                             | 0    | 0     | 0   | 0                              | 0    | 0     | 2   | 0                            | 0    | 0     | 0   | 0                            | 0    | 0     | 0   |

\* Peak hour corresponds to vehicular peak hours.

Client: Matt Duranleau  
Project #: 12239.00\_127\_018\_VHB  
BTD #: Location 1  
Location: Newton, MA  
Street 1: Chestnut Street / Boylston Street  
Street 2: Route 9 WB Service Road  
Count Date: 10/28/2017  
Day of Week: Saturday  
Weather: Sun w/ Clouds, 65°F



TOTAL (CARS & TRUCKS)

| Chestnut Street Northbound |        |      |      |       | Chestnut Street Southbound |      |      |       |        | Boylston Street Eastbound |      |       |        |      | Route 9 WB Service Road (Boylston Street) Westbound |       |  |  |  |
|----------------------------|--------|------|------|-------|----------------------------|------|------|-------|--------|---------------------------|------|-------|--------|------|-----------------------------------------------------|-------|--|--|--|
| Start Time                 | U-Turn | Left | Thru | Right | U-Turn                     | Left | Thru | Right | U-Turn | Left                      | Thru | Right | U-Turn | Left | Thru                                                | Right |  |  |  |
| 11:00 AM                   | 0      | 8    | 77   | 0     | 0                          | 0    | 76   | 29    | 0      | 0                         | 0    | 0     | 0      | 23   | 2                                                   | 13    |  |  |  |
| 11:15 AM                   | 0      | 9    | 83   | 0     | 0                          | 1    | 82   | 32    | 0      | 1                         | 0    | 0     | 0      | 20   | 3                                                   | 12    |  |  |  |
| 11:30 AM                   | 0      | 8    | 86   | 0     | 0                          | 1    | 87   | 34    | 0      | 2                         | 0    | 1     | 0      | 17   | 3                                                   | 10    |  |  |  |
| 11:45 AM                   | 0      | 11   | 99   | 1     | 0                          | 0    | 89   | 35    | 0      | 0                         | 0    | 0     | 0      | 15   | 4                                                   | 8     |  |  |  |
| 12:00 PM                   | 0      | 9    | 111  | 0     | 0                          | 0    | 91   | 39    | 0      | 0                         | 1    | 1     | 0      | 13   | 5                                                   | 6     |  |  |  |
| 12:15 PM                   | 0      | 10   | 105  | 0     | 0                          | 0    | 92   | 37    | 0      | 1                         | 0    | 0     | 0      | 14   | 6                                                   | 7     |  |  |  |
| 12:30 PM                   | 0      | 11   | 94   | 0     | 0                          | 1    | 90   | 38    | 0      | 1                         | 0    | 0     | 0      | 15   | 5                                                   | 8     |  |  |  |
| 12:45 PM                   | 0      | 13   | 92   | 1     | 0                          | 0    | 88   | 35    | 0      | 0                         | 0    | 0     | 0      | 16   | 7                                                   | 9     |  |  |  |
| 1:00 PM                    | 0      | 14   | 87   | 0     | 0                          | 0    | 89   | 37    | 0      | 0                         | 0    | 1     | 0      | 14   | 6                                                   | 10    |  |  |  |
| 1:15 AM                    | 0      | 12   | 89   | 1     | 0                          | 1    | 86   | 38    | 0      | 1                         | 1    | 1     | 0      | 15   | 5                                                   | 11    |  |  |  |
| 1:30 AM                    | 0      | 13   | 91   | 0     | 0                          | 1    | 87   | 40    | 0      | 0                         | 0    | 0     | 0      | 13   | 4                                                   | 9     |  |  |  |
| 1:45 AM                    | 0      | 11   | 88   | 0     | 0                          | 0    | 84   | 36    | 0      | 1                         | 0    | 0     | 0      | 14   | 5                                                   | 8     |  |  |  |

| SAT PEAK HOUR<br>11:45 AM<br>to<br>12:45 PM<br><br>PHF<br>HV % |  | Chestnut Street<br>Northbound |      |      |       | Chestnut Street<br>Southbound |      |      |       | Boylston Street<br>Eastbound |      |      |       | Route 9 WB Service Road (Boylston Street)<br>Westbound |      |      |       |    |
|----------------------------------------------------------------|--|-------------------------------|------|------|-------|-------------------------------|------|------|-------|------------------------------|------|------|-------|--------------------------------------------------------|------|------|-------|----|
|                                                                |  | U-Turn                        | Left | Thru | Right | U-Turn                        | Left | Thru | Right | U-Turn                       | Left | Thru | Right | U-Turn                                                 | Left | Thru | Right |    |
|                                                                |  | 0                             | 41   | 409  | 1     | 0                             | 1    | 362  | 149   | 0                            | 2    | 1    | 1     | 1                                                      | 0    | 57   | 20    | 29 |
|                                                                |  | 0.94                          |      |      |       | 0.98                          |      |      |       | 0.50                         |      |      |       | 0.95                                                   |      |      |       |    |
|                                                                |  | 0.0%                          | 2.4% | 0.2% | 0.0%  | 0.0%                          | 0.0% | 0.3% | 0.7%  | 0.0%                         | 0.0% | 0.0% | 0.0%  | 0.0%                                                   | 0.0% | 0.0% | 0.0%  |    |

Client: Matt Duranleau  
Project #: 12239.00\_127\_018\_VHB  
BTD #: Location 1  
Location: Newton, MA  
Street 1: Chestnut Street / Boylston Street  
Street 2: Route 9 WB Service Road  
Count Date: 10/28/2017  
Day of Week: Saturday  
Weather: Sun w/ Clouds, 65°F



TRUCKS

| Route 9 WB Service Road (Boylston Street) |                            |      |      |                            |                            |      |      |                           |                           |      |      |                                                     |                                                     |      |      |       |
|-------------------------------------------|----------------------------|------|------|----------------------------|----------------------------|------|------|---------------------------|---------------------------|------|------|-----------------------------------------------------|-----------------------------------------------------|------|------|-------|
| Chestnut Street Northbound                |                            |      |      | Chestnut Street Southbound |                            |      |      | Boylston Street Eastbound |                           |      |      | Route 9 WB Service Road (Boylston Street) Westbound |                                                     |      |      |       |
| Start Time                                | U-Turn                     | Left | Thru | Right                      | U-Turn                     | Left | Thru | Right                     | U-Turn                    | Left | Thru | Right                                               | U-Turn                                              | Left | Thru | Right |
| 11:00 AM                                  | 0                          | 0    | 1    | 0                          | 0                          | 0    | 0    | 0                         | 0                         | 0    | 0    | 0                                                   | 0                                                   | 0    | 0    | 0     |
| 11:15 AM                                  | 0                          | 0    | 0    | 0                          | 0                          | 0    | 0    | 0                         | 0                         | 0    | 0    | 0                                                   | 0                                                   | 0    | 0    | 0     |
| 11:30 AM                                  | 0                          | 0    | 0    | 0                          | 0                          | 0    | 0    | 1                         | 0                         | 0    | 0    | 0                                                   | 0                                                   | 0    | 0    | 0     |
| 11:45 AM                                  | 0                          | 1    | 1    | 0                          | 0                          | 0    | 0    | 0                         | 1                         | 0    | 0    | 0                                                   | 0                                                   | 0    | 0    | 0     |
| 12:00 PM                                  | 0                          | 0    | 0    | 0                          | 0                          | 0    | 1    | 0                         | 0                         | 0    | 0    | 0                                                   | 0                                                   | 0    | 0    | 0     |
| 12:15 PM                                  | 0                          | 0    | 0    | 0                          | 0                          | 0    | 0    | 0                         | 0                         | 0    | 0    | 0                                                   | 0                                                   | 0    | 0    | 0     |
| 12:30 PM                                  | 0                          | 0    | 0    | 0                          | 0                          | 0    | 0    | 0                         | 0                         | 0    | 0    | 0                                                   | 0                                                   | 0    | 0    | 0     |
| 12:45 PM                                  | 0                          | 0    | 1    | 0                          | 0                          | 0    | 2    | 0                         | 0                         | 0    | 0    | 0                                                   | 0                                                   | 0    | 0    | 0     |
| 1:00 PM                                   | 0                          | 0    | 0    | 0                          | 0                          | 0    | 0    | 0                         | 0                         | 0    | 0    | 0                                                   | 0                                                   | 0    | 0    | 0     |
| 1:15 AM                                   | 0                          | 0    | 1    | 0                          | 0                          | 0    | 0    | 0                         | 0                         | 0    | 0    | 0                                                   | 0                                                   | 0    | 0    | 0     |
| 1:30 AM                                   | 0                          | 0    | 0    | 0                          | 0                          | 0    | 0    | 0                         | 0                         | 0    | 0    | 0                                                   | 0                                                   | 0    | 0    | 0     |
| 1:45 AM                                   | 0                          | 0    | 0    | 0                          | 0                          | 0    | 0    | 1                         | 0                         | 0    | 0    | 0                                                   | 0                                                   | 0    | 0    | 0     |
| SAT PEAK HOUR                             |                            |      |      |                            |                            |      |      |                           |                           |      |      |                                                     |                                                     |      |      |       |
| 11:00 AM to 12:00 PM                      | Chestnut Street Northbound |      |      |                            | Chestnut Street Southbound |      |      |                           | Boylston Street Eastbound |      |      |                                                     | Route 9 WB Service Road (Boylston Street) Westbound |      |      |       |
|                                           | U-Turn                     | Left | Thru | Right                      | U-Turn                     | Left | Thru | Right                     | U-Turn                    | Left | Thru | Right                                               | U-Turn                                              | Left | Thru | Right |
| PHF                                       | 0                          | 0.38 | 2    | 0                          | 0                          | 0.50 | 2    | 0                         | 0                         | 0.00 | 0    | 0                                                   | 0                                                   | 0.00 | 0    | 0     |

Client: Matt Duranleau  
Project #: 12239.00\_127\_018\_VHB  
BTD #: Location 1  
Location: Newton, MA  
Street 1: Chestnut Street / Boylston Street  
Street 2: Route 9 WB Service Road  
Count Date: 10/28/2017  
Day of Week: Saturday  
Weather: Sun w/ Clouds, 65°F



PEDESTRIANS & BICYCLES

| Start Time           | Chestnut Street Northbound |      |       |     | Chestnut Street Southbound |      |       |     | Boylston Street Eastbound |      |       |     | Route 9 WB Service Road (Boylston Street) Westbound |      |       |     |
|----------------------|----------------------------|------|-------|-----|----------------------------|------|-------|-----|---------------------------|------|-------|-----|-----------------------------------------------------|------|-------|-----|
|                      | Left                       | Thru | Right | PED | Left                       | Thru | Right | PED | Left                      | Thru | Right | PED | Left                                                | Thru | Right | PED |
| 11:00 AM             | 0                          | 0    | 0     | 0   | 0                          | 0    | 0     | 0   | 0                         | 0    | 0     | 0   | 1                                                   | 0    | 0     | 0   |
| 11:15 AM             | 0                          | 0    | 0     | 0   | 0                          | 0    | 0     | 0   | 0                         | 0    | 0     | 0   | 0                                                   | 0    | 0     | 0   |
| 11:30 AM             | 0                          | 0    | 0     | 0   | 0                          | 0    | 0     | 0   | 0                         | 0    | 0     | 0   | 0                                                   | 0    | 0     | 0   |
| 11:45 AM             | 0                          | 0    | 0     | 0   | 0                          | 0    | 0     | 0   | 0                         | 0    | 0     | 0   | 0                                                   | 0    | 0     | 0   |
| 12:00 PM             | 0                          | 0    | 0     | 0   | 0                          | 0    | 0     | 0   | 0                         | 0    | 0     | 0   | 0                                                   | 0    | 0     | 0   |
| 12:15 PM             | 0                          | 1    | 0     | 0   | 0                          | 0    | 0     | 0   | 0                         | 0    | 0     | 0   | 0                                                   | 0    | 0     | 0   |
| 12:30 PM             | 0                          | 3    | 0     | 0   | 0                          | 0    | 0     | 0   | 0                         | 0    | 0     | 0   | 0                                                   | 0    | 0     | 0   |
| 12:45 PM             | 0                          | 0    | 0     | 0   | 0                          | 0    | 0     | 0   | 0                         | 0    | 0     | 0   | 0                                                   | 0    | 0     | 0   |
| 1:00 PM              | 0                          | 0    | 0     | 0   | 0                          | 0    | 0     | 0   | 0                         | 0    | 0     | 0   | 0                                                   | 0    | 0     | 0   |
| 1:15 AM              | 0                          | 0    | 0     | 0   | 0                          | 0    | 0     | 0   | 0                         | 0    | 0     | 0   | 0                                                   | 0    | 0     | 0   |
| 1:30 AM              | 0                          | 0    | 0     | 0   | 0                          | 0    | 0     | 0   | 0                         | 0    | 0     | 0   | 0                                                   | 0    | 0     | 0   |
| 1:45 AM              | 0                          | 0    | 0     | 0   | 0                          | 0    | 0     | 0   | 0                         | 0    | 0     | 0   | 0                                                   | 0    | 0     | 0   |
| SAT PEAK HOUR        |                            |      |       |     |                            |      |       |     |                           |      |       |     |                                                     |      |       |     |
| 11:45 AM to 12:45 PM | 0                          | 4    | 0     | 0   | 0                          | 0    | 0     | 0   | 0                         | 0    | 0     | 0   | 0                                                   | 0    | 0     | 0   |
| PHF                  | 0.33                       |      |       |     | 0.33                       |      |       |     | 0.33                      |      |       |     | 0.33                                                |      |       |     |

Client: Matt Duranleau  
Project #: 12239.00\_127\_018\_VHB  
BTD #: Location 2  
Location: Newton, MA  
Street 1: Chestnut Street / Boylston Street  
Street 2: Route 9 EB Service Road  
Count Date: 10/28/2017  
Day of Week: Saturday  
Weather: Sun w/ Clouds, 65°F



**TOTAL (CARS & TRUCKS)**

| Start Time | Chestnut Street Northbound |      |      |       | Chestnut Street Southbound |      |      |       | Route 9 EB Service Road (Boylston Street) Eastbound |      |      |       | Boylston Street Westbound |      |      |       |
|------------|----------------------------|------|------|-------|----------------------------|------|------|-------|-----------------------------------------------------|------|------|-------|---------------------------|------|------|-------|
|            | U-Turn                     | Left | Thru | Right | U-Turn                     | Left | Thru | Right | U-Turn                                              | Left | Thru | Right | U-Turn                    | Left | Thru | Right |
| 11:00 AM   | 0                          | 0    | 56   | 9     | 0                          | 17   | 82   | 0     | 0                                                   | 26   | 29   | 4     | 0                         | 0    | 0    | 3     |
| 11:15 AM   | 0                          | 0    | 61   | 11    | 0                          | 16   | 85   | 1     | 0                                                   | 29   | 32   | 4     | 0                         | 0    | 0    | 2     |
| 11:30 AM   | 0                          | 0    | 60   | 10    | 0                          | 18   | 86   | 1     | 0                                                   | 31   | 31   | 3     | 0                         | 0    | 1    | 3     |
| 11:45 AM   | 0                          | 1    | 74   | 12    | 0                          | 19   | 85   | 0     | 0                                                   | 33   | 33   | 5     | 0                         | 0    | 0    | 4     |
| 12:00 PM   | 0                          | 0    | 81   | 11    | 0                          | 21   | 84   | 0     | 0                                                   | 34   | 32   | 4     | 0                         | 1    | 0    | 5     |
| 12:15 PM   | 0                          | 0    | 79   | 12    | 0                          | 23   | 82   | 1     | 0                                                   | 31   | 33   | 5     | 0                         | 0    | 1    | 5     |
| 12:30 PM   | 0                          | 0    | 74   | 10    | 0                          | 24   | 81   | 0     | 0                                                   | 27   | 30   | 4     | 0                         | 0    | 1    | 4     |
| 12:45 PM   | 0                          | 0    | 77   | 9     | 0                          | 25   | 79   | 0     | 0                                                   | 24   | 29   | 5     | 0                         | 0    | 0    | 5     |
| 1:00 PM    | 0                          | 0    | 74   | 8     | 0                          | 28   | 75   | 1     | 0                                                   | 21   | 27   | 3     | 0                         | 0    | 0    | 6     |
| 1:15 AM    | 0                          | 0    | 78   | 10    | 0                          | 27   | 74   | 1     | 0                                                   | 20   | 28   | 4     | 0                         | 0    | 1    | 4     |
| 1:30 AM    | 0                          | 0    | 80   | 7     | 0                          | 25   | 75   | 0     | 0                                                   | 19   | 25   | 3     | 0                         | 0    | 0    | 5     |
| 1:45 AM    | 0                          | 0    | 78   | 6     | 0                          | 26   | 72   | 0     | 0                                                   | 17   | 23   | 3     | 0                         | 0    | 0    | 4     |

| SAT PEAK HOUR<br>11:45 AM<br>to<br>12:45 PM | Chestnut Street Northbound |      |      |       | Chestnut Street Southbound |      |      |       | Route 9 EB Service Road (Boylston Street) Eastbound |      |      |       | Boylston Street Westbound |      |      |       |
|---------------------------------------------|----------------------------|------|------|-------|----------------------------|------|------|-------|-----------------------------------------------------|------|------|-------|---------------------------|------|------|-------|
|                                             | U-Turn                     | Left | Thru | Right | U-Turn                     | Left | Thru | Right | U-Turn                                              | Left | Thru | Right | U-Turn                    | Left | Thru | Right |
|                                             | 0                          | 1    | 308  | 45    | 0                          | 87   | 332  | 1     | 0                                                   | 125  | 128  | 18    | 0                         | 1    | 2    | 18    |
| PHF                                         | 0.96                       |      |      |       | 0.99                       |      |      |       | 0.95                                                |      |      |       | 0.88                      |      |      |       |
| HV %                                        | 0.0%                       | 0.0% | 0.6% | 2.2%  | 0.0%                       | 0.0% | 0.3% | 0.0%  | 0.0%                                                | 0.0% | 0.0% | 0.0%  | 0.0%                      | 0.0% | 0.0% | 0.0%  |

11/10/2017, 1:46 PM, 12239.00\_127\_018\_TMC\_Loc 2 (Saturday)

Client: Matt Duranleau  
Project #: 12239.00\_127\_018\_VHB  
BTD #: Location 2  
Location: Newton, MA  
Street 1: Chestnut Street / Boylston Street  
Street 2: Route 9 EB Service Road  
Count Date: 10/28/2017  
Day of Week: Saturday  
Weather: Sun w/ Clouds, 65°F



**TRUCKS**

| Start Time | Chestnut Street Northbound |      |      |       | Chestnut Street Southbound |      |      |       | Route 9 EB Service Road (Boylston Street) Eastbound |      |      |       | Boylston Street Westbound |      |      |       |
|------------|----------------------------|------|------|-------|----------------------------|------|------|-------|-----------------------------------------------------|------|------|-------|---------------------------|------|------|-------|
|            | U-Turn                     | Left | Thru | Right | U-Turn                     | Left | Thru | Right | U-Turn                                              | Left | Thru | Right | U-Turn                    | Left | Thru | Right |
| 11:00 AM   | 0                          | 0    | 1    | 0     | 0                          | 0    | 0    | 0     | 0                                                   | 0    | 0    | 0     | 0                         | 0    | 0    | 0     |
| 11:15 AM   | 0                          | 0    | 0    | 0     | 0                          | 0    | 0    | 0     | 0                                                   | 0    | 0    | 0     | 0                         | 0    | 0    | 0     |
| 11:30 AM   | 0                          | 0    | 0    | 0     | 0                          | 0    | 0    | 0     | 0                                                   | 0    | 0    | 0     | 0                         | 0    | 0    | 0     |
| 11:45 AM   | 0                          | 0    | 1    | 1     | 0                          | 0    | 0    | 0     | 0                                                   | 0    | 0    | 0     | 0                         | 0    | 0    | 0     |
| 12:00 PM   | 0                          | 0    | 1    | 0     | 0                          | 0    | 1    | 0     | 0                                                   | 0    | 0    | 0     | 0                         | 0    | 0    | 0     |
| 12:15 PM   | 0                          | 0    | 0    | 0     | 0                          | 0    | 0    | 0     | 0                                                   | 0    | 0    | 0     | 0                         | 0    | 0    | 0     |
| 12:30 PM   | 0                          | 0    | 0    | 0     | 0                          | 0    | 0    | 0     | 0                                                   | 0    | 0    | 0     | 0                         | 0    | 0    | 0     |
| 12:45 PM   | 0                          | 0    | 1    | 0     | 0                          | 0    | 1    | 0     | 0                                                   | 0    | 0    | 0     | 0                         | 0    | 0    | 0     |
| 1:00 PM    | 0                          | 0    | 0    | 0     | 0                          | 0    | 1    | 0     | 0                                                   | 0    | 0    | 0     | 0                         | 0    | 0    | 0     |
| 1:15 AM    | 0                          | 0    | 1    | 0     | 0                          | 0    | 0    | 0     | 0                                                   | 0    | 0    | 0     | 0                         | 0    | 0    | 0     |
| 1:30 AM    | 0                          | 0    | 0    | 0     | 0                          | 0    | 0    | 0     | 0                                                   | 0    | 0    | 0     | 0                         | 0    | 0    | 0     |
| 1:45 AM    | 0                          | 0    | 0    | 0     | 0                          | 0    | 0    | 0     | 0                                                   | 0    | 0    | 0     | 0                         | 0    | 0    | 0     |

| SAT PEAK HOUR<br>11:15 AM<br>to<br>12:15 PM | Chestnut Street Northbound |      |      |       | Chestnut Street Southbound |      |      |       | Route 9 EB Service Road (Boylston Street) Eastbound |      |      |       | Boylston Street Westbound |      |      |       |
|---------------------------------------------|----------------------------|------|------|-------|----------------------------|------|------|-------|-----------------------------------------------------|------|------|-------|---------------------------|------|------|-------|
|                                             | U-Turn                     | Left | Thru | Right | U-Turn                     | Left | Thru | Right | U-Turn                                              | Left | Thru | Right | U-Turn                    | Left | Thru | Right |
|                                             | 0                          | 0    | 2    | 1     | 0                          | 0    | 1    | 0     | 0                                                   | 0    | 0    | 0     | 0                         | 0    | 0    | 0     |
| PHF                                         | 0.38                       |      |      |       | 0.25                       |      |      |       | 0.00                                                |      |      |       | 0.00                      |      |      |       |

11/10/2017, 1:46 PM, 12239.00\_127\_018\_TMC\_Loc 2 (Saturday)

Client: Matt Duranleau  
Project #: 12239.00\_127\_018\_VHB  
BTD #: Location 2  
Location: Newton, MA  
Street 1: Chestnut Street / Boylston Street  
Street 2: Route 9 EB Service Road  
Count Date: 10/26/2017  
Day of Week: Saturday  
Weather: Sun w/ Clouds, 65°F



PEDESTRIANS & BICYCLES

| Chestnut Street Northbound |      |      |       |     | Chestnut Street Southbound |      |       |     |      | Route 9 EB Service Road (Boylston Street) Eastbound |       |     |      |      | Boylston Street Westbound |     |  |  |  |
|----------------------------|------|------|-------|-----|----------------------------|------|-------|-----|------|-----------------------------------------------------|-------|-----|------|------|---------------------------|-----|--|--|--|
| Start Time                 | Left | Thru | Right | PED | Left                       | Thru | Right | PED | Left | Thru                                                | Right | PED | Left | Thru | Right                     | PED |  |  |  |
| 11:00 AM                   | 0    | 0    | 0     | 0   | 0                          | 0    | 0     | 0   | 0    | 0                                                   | 0     | 0   | 0    | 0    | 0                         | 0   |  |  |  |
| 11:15 AM                   | 0    | 0    | 0     | 1   | 0                          | 0    | 0     | 0   | 0    | 0                                                   | 0     | 0   | 0    | 0    | 0                         | 1   |  |  |  |
| 11:30 AM                   | 0    | 0    | 0     | 2   | 0                          | 0    | 0     | 0   | 0    | 0                                                   | 0     | 0   | 0    | 0    | 0                         | 1   |  |  |  |
| 11:45 AM                   | 0    | 0    | 0     | 0   | 0                          | 0    | 0     | 0   | 0    | 0                                                   | 0     | 0   | 0    | 0    | 0                         | 0   |  |  |  |
| 12:00 PM                   | 0    | 0    | 0     | 0   | 0                          | 0    | 0     | 0   | 0    | 0                                                   | 0     | 1   | 0    | 0    | 0                         | 0   |  |  |  |
| 12:15 PM                   | 0    | 1    | 0     | 0   | 0                          | 0    | 0     | 0   | 0    | 0                                                   | 0     | 0   | 0    | 0    | 0                         | 0   |  |  |  |
| 12:30 PM                   | 0    | 3    | 0     | 0   | 0                          | 0    | 0     | 0   | 0    | 0                                                   | 0     | 0   | 0    | 0    | 0                         | 0   |  |  |  |
| 12:45 PM                   | 0    | 0    | 0     | 1   | 0                          | 1    | 0     | 0   | 0    | 0                                                   | 0     | 1   | 0    | 0    | 0                         | 1   |  |  |  |
| 1:00 PM                    | 0    | 0    | 0     | 0   | 0                          | 0    | 0     | 0   | 0    | 0                                                   | 0     | 1   | 0    | 0    | 0                         | 0   |  |  |  |
| 1:15 AM                    | 0    | 0    | 0     | 0   | 0                          | 0    | 0     | 0   | 0    | 0                                                   | 0     | 0   | 0    | 0    | 0                         | 0   |  |  |  |
| 1:30 AM                    | 0    | 0    | 0     | 0   | 0                          | 0    | 0     | 0   | 0    | 0                                                   | 0     | 0   | 0    | 0    | 0                         | 0   |  |  |  |
| 1:45 AM                    | 0    | 0    | 0     | 0   | 0                          | 0    | 0     | 0   | 0    | 0                                                   | 0     | 0   | 0    | 0    | 0                         | 1   |  |  |  |

| SAT PEAK HOUR<br>11:45 AM<br>to<br>12:45 PM | Chestnut Street<br>Northbound |      |       |     | Chestnut Street<br>Southbound |      |       |     | Route 9 EB Service Road (Boylston Street)<br>Eastbound |      |       |     | Boylston Street<br>Westbound |      |       |     |   |
|---------------------------------------------|-------------------------------|------|-------|-----|-------------------------------|------|-------|-----|--------------------------------------------------------|------|-------|-----|------------------------------|------|-------|-----|---|
|                                             | Left                          | Thru | Right | PED | Left                          | Thru | Right | PED | Left                                                   | Thru | Right | PED | Left                         | Thru | Right | PED |   |
|                                             | 0                             | 4    | 0     | 2   |                               | 0    | 0     | 0   | 0                                                      | 0    | 0     | 0   | 1                            |      | 0     | 0   | 0 |

\* Peak hours corresponds to vehicular peak hours.

Client: Matt Duranleau  
Project #: 12239.00\_127\_018\_VHB  
BTD #: Location 3  
Location: Newton, MA  
Street 1: Chestnut Street  
Street 2: Elliot Street  
Count Date: 10/26/2017  
Day of Week: Saturday  
Weather: Sun w/ Clouds, 65°F



TOTAL (CARS & TRUCKS)

| Chestnut Street Northbound |        |      |      |       | Chestnut Street Southbound |      |      |       |        | Elliot Street Eastbound |      |       |        |      | Elliot Street Westbound |       |  |  |  |
|----------------------------|--------|------|------|-------|----------------------------|------|------|-------|--------|-------------------------|------|-------|--------|------|-------------------------|-------|--|--|--|
| Start Time                 | U-Turn | Left | Thru | Right | U-Turn                     | Left | Thru | Right | U-Turn | Left                    | Thru | Right | U-Turn | Left | Thru                    | Right |  |  |  |
| 11:00 AM                   | 0      | 15   | 42   | 2     | 0                          | 5    | 72   | 53    | 0      | 43                      | 42   | 6     | 0      | 0    | 24                      | 6     |  |  |  |
| 11:15 AM                   | 0      | 17   | 43   | 3     | 0                          | 9    | 63   | 56    | 0      | 46                      | 45   | 7     | 0      | 1    | 27                      | 11    |  |  |  |
| 11:30 AM                   | 0      | 18   | 41   | 2     | 0                          | 11   | 64   | 57    | 0      | 45                      | 44   | 9     | 0      | 1    | 26                      | 15    |  |  |  |
| 11:45 AM                   | 0      | 20   | 44   | 2     | 0                          | 12   | 61   | 54    | 0      | 43                      | 42   | 8     | 0      | 2    | 28                      | 19    |  |  |  |
| 12:00 PM                   | 0      | 22   | 45   | 1     | 0                          | 14   | 62   | 55    | 0      | 40                      | 41   | 10    | 0      | 1    | 29                      | 22    |  |  |  |
| 12:15 PM                   | 0      | 21   | 46   | 3     | 0                          | 15   | 59   | 52    | 0      | 41                      | 38   | 9     | 0      | 2    | 31                      | 20    |  |  |  |
| 12:30 PM                   | 0      | 19   | 43   | 2     | 0                          | 14   | 61   | 50    | 0      | 44                      | 39   | 11    | 0      | 2    | 30                      | 17    |  |  |  |
| 12:45 PM                   | 0      | 18   | 44   | 3     | 0                          | 13   | 60   | 46    | 0      | 45                      | 36   | 12    | 0      | 1    | 32                      | 15    |  |  |  |
| 1:00 PM                    | 0      | 16   | 41   | 3     | 0                          | 12   | 62   | 42    | 0      | 48                      | 38   | 14    | 0      | 2    | 28                      | 12    |  |  |  |
| 1:15 AM                    | 0      | 18   | 42   | 2     | 0                          | 10   | 61   | 37    | 0      | 49                      | 37   | 16    | 0      | 2    | 29                      | 14    |  |  |  |
| 1:30 AM                    | 0      | 17   | 40   | 2     | 0                          | 12   | 63   | 38    | 0      | 46                      | 38   | 15    | 0      | 1    | 27                      | 13    |  |  |  |
| 1:45 AM                    | 0      | 15   | 38   | 3     | 0                          | 11   | 58   | 35    | 0      | 47                      | 35   | 13    | 0      | 2    | 25                      | 12    |  |  |  |

| Chestnut Street Northbound |      |      |       | Chestnut Street Southbound |      |      |       | Elliot Street Eastbound |      |      |       | Elliot Street Westbound |      |      |       |
|----------------------------|------|------|-------|----------------------------|------|------|-------|-------------------------|------|------|-------|-------------------------|------|------|-------|
| U-Turn                     | Left | Thru | Right | U-Turn                     | Left | Thru | Right | U-Turn                  | Left | Thru | Right | U-Turn                  | Left | Thru | Right |
| 0                          | 81   | 176  | 8     | 0                          | 52   | 246  | 218   | 0                       | 169  | 165  | 36    | 0                       | 6    | 114  | 76    |
| PHF                        |      |      |       | 0.95                       |      |      |       | 0.98                    |      |      |       | 0.94                    |      |      |       |
| HV %                       |      |      |       | 0.0%                       |      |      |       | 0.0%                    |      |      |       | 0.0%                    |      |      |       |

Client: Matt Duranleau  
Project #: 12239.00\_127\_018\_VHB  
BTD #: Location 3  
Location: Newton, MA  
Street 1: Chestnut Street  
Street 2: Elliot Street  
Count Date: 10/28/2017  
Day of Week: Saturday  
Weather: Sun w/ Clouds, 65°F



TRUCKS

| Start Time | Chestnut Street Northbound |      |      |       | Chestnut Street Southbound |      |      |       | Elliot Street Eastbound |      |      |       | Elliot Street Westbound |      |      |       |
|------------|----------------------------|------|------|-------|----------------------------|------|------|-------|-------------------------|------|------|-------|-------------------------|------|------|-------|
|            | U-Turn                     | Left | Thru | Right | U-Turn                     | Left | Thru | Right | U-Turn                  | Left | Thru | Right | U-Turn                  | Left | Thru | Right |
| 11:00 AM   | 0                          | 0    | 0    | 0     | 0                          | 0    | 0    | 0     | 0                       | 0    | 0    | 0     | 0                       | 0    | 0    | 0     |
| 11:15 AM   | 0                          | 0    | 0    | 0     | 0                          | 0    | 0    | 0     | 0                       | 0    | 0    | 0     | 0                       | 0    | 0    | 0     |
| 11:30 AM   | 0                          | 0    | 0    | 0     | 0                          | 0    | 0    | 0     | 0                       | 0    | 0    | 0     | 0                       | 0    | 0    | 0     |
| 11:45 AM   | 0                          | 0    | 1    | 0     | 0                          | 0    | 0    | 0     | 0                       | 0    | 0    | 0     | 0                       | 0    | 0    | 0     |
| 12:00 PM   | 0                          | 0    | 0    | 0     | 0                          | 0    | 1    | 0     | 0                       | 0    | 0    | 0     | 0                       | 0    | 0    | 0     |
| 12:15 PM   | 0                          | 0    | 0    | 0     | 0                          | 0    | 0    | 0     | 0                       | 0    | 0    | 0     | 0                       | 0    | 1    | 0     |
| 12:30 PM   | 0                          | 0    | 0    | 0     | 0                          | 0    | 0    | 0     | 0                       | 0    | 0    | 0     | 0                       | 0    | 0    | 0     |
| 12:45 PM   | 0                          | 0    | 0    | 0     | 0                          | 0    | 0    | 0     | 0                       | 0    | 0    | 0     | 0                       | 0    | 0    | 0     |
| 1:00 PM    | 0                          | 0    | 1    | 0     | 0                          | 0    | 0    | 0     | 0                       | 0    | 0    | 0     | 0                       | 0    | 0    | 0     |
| 1:15 AM    | 0                          | 0    | 0    | 0     | 0                          | 1    | 0    | 0     | 0                       | 1    | 0    | 0     | 0                       | 0    | 0    | 0     |
| 1:30 AM    | 0                          | 0    | 0    | 0     | 0                          | 0    | 0    | 0     | 0                       | 0    | 0    | 0     | 0                       | 0    | 0    | 0     |
| 1:45 AM    | 0                          | 0    | 0    | 0     | 0                          | 0    | 0    | 0     | 0                       | 0    | 0    | 0     | 0                       | 0    | 0    | 0     |

| SAT PEAK HOUR<br>12:30 PM<br>to<br>1:30 AM | Chestnut Street Northbound |      |      |       | Chestnut Street Southbound |      |      |       | Elliot Street Eastbound |      |      |       | Elliot Street Westbound |      |      |       |
|--------------------------------------------|----------------------------|------|------|-------|----------------------------|------|------|-------|-------------------------|------|------|-------|-------------------------|------|------|-------|
|                                            | U-Turn                     | Left | Thru | Right | U-Turn                     | Left | Thru | Right | U-Turn                  | Left | Thru | Right | U-Turn                  | Left | Thru | Right |
| PHF                                        | 0                          | 0    | 1    | 0     | 0                          | 1    | 1    | 0     | 0                       | 1    | 1    | 0     | 0                       | 0    | 0    | 0     |
|                                            | 0.25                       |      |      |       | 0.50                       |      |      |       | 0.50                    |      |      |       | 0.00                    |      |      |       |

Client: Matt Duranleau  
Project #: 12239.00\_127\_018\_VHB  
BTD #: Location 3  
Location: Newton, MA  
Street 1: Chestnut Street  
Street 2: Elliot Street  
Count Date: 10/28/2017  
Day of Week: Saturday  
Weather: Sun w/ Clouds, 65°F



PEDESTRIANS & BICYCLES

| Start Time | Chestnut Street Northbound |      |       |     | Chestnut Street Southbound |      |       |     | Elliot Street Eastbound |      |       |     | Elliot Street Westbound |      |       |     |
|------------|----------------------------|------|-------|-----|----------------------------|------|-------|-----|-------------------------|------|-------|-----|-------------------------|------|-------|-----|
|            | Left                       | Thru | Right | PED | Left                       | Thru | Right | PED | Left                    | Thru | Right | PED | Left                    | Thru | Right | PED |
| 11:00 AM   | 0                          | 0    | 0     | 0   | 0                          | 0    | 1     | 0   | 0                       | 0    | 0     | 1   | 0                       | 1    | 0     | 0   |
| 11:15 AM   | 0                          | 0    | 0     | 1   | 0                          | 0    | 0     | 2   | 0                       | 0    | 0     | 1   | 0                       | 0    | 0     | 0   |
| 11:30 AM   | 0                          | 0    | 0     | 0   | 0                          | 0    | 0     | 0   | 0                       | 0    | 0     | 0   | 0                       | 0    | 0     | 0   |
| 11:45 AM   | 0                          | 0    | 0     | 0   | 0                          | 0    | 0     | 0   | 0                       | 1    | 0     | 0   | 0                       | 0    | 0     | 1   |
| 12:00 PM   | 0                          | 0    | 0     | 3   | 0                          | 2    | 0     | 0   | 0                       | 0    | 0     | 0   | 0                       | 0    | 0     | 0   |
| 12:15 PM   | 0                          | 1    | 0     | 1   | 0                          | 0    | 0     | 3   | 0                       | 0    | 0     | 1   | 0                       | 1    | 0     | 0   |
| 12:30 PM   | 0                          | 1    | 0     | 0   | 0                          | 0    | 0     | 0   | 0                       | 0    | 0     | 2   | 0                       | 2    | 0     | 0   |
| 12:45 PM   | 0                          | 0    | 0     | 1   | 0                          | 1    | 0     | 2   | 0                       | 0    | 0     | 1   | 0                       | 0    | 0     | 1   |
| 1:00 PM    | 0                          | 0    | 0     | 2   | 0                          | 0    | 0     | 1   | 0                       | 0    | 0     | 2   | 0                       | 1    | 0     | 1   |
| 1:15 AM    | 0                          | 1    | 0     | 2   | 0                          | 0    | 0     | 0   | 0                       | 1    | 0     | 0   | 0                       | 0    | 0     | 0   |
| 1:30 AM    | 0                          | 0    | 0     | 0   | 0                          | 0    | 0     | 1   | 0                       | 0    | 0     | 1   | 0                       | 0    | 0     | 0   |
| 1:45 AM    | 0                          | 0    | 0     | 0   | 0                          | 0    | 0     | 0   | 0                       | 0    | 0     | 2   | 0                       | 1    | 0     | 0   |

| SAT PEAK HOUR<br>11:30 AM<br>to<br>12:30 PM | Chestnut Street Northbound |      |       |     | Chestnut Street Southbound |      |       |     | Elliot Street Eastbound |      |       |     | Elliot Street Westbound |      |       |     |
|---------------------------------------------|----------------------------|------|-------|-----|----------------------------|------|-------|-----|-------------------------|------|-------|-----|-------------------------|------|-------|-----|
|                                             | Left                       | Thru | Right | PED | Left                       | Thru | Right | PED | Left                    | Thru | Right | PED | Left                    | Thru | Right | PED |
|                                             | 0                          | 1    | 0     | 4   | 0                          | 2    | 0     | 3   | 0                       | 1    | 0     | 1   | 0                       | 1    | 0     | 1   |

\* Peak hours corresponds to vehicular peak hours.



Client: Matt Duranleau  
Project #: 12239.00\_127\_018\_VHB  
BTD #: Location 4  
Location: Newton, MA  
Street 1: Chestnut Street  
Street 2: Oak Street  
Count Date: 10/28/2017  
Day of Week: Saturday  
Weather: Sun w/ Clouds, 65°F



**TOTAL (CARS & TRUCKS)**

| Start Time | Oak Street Northbound |      |      | Oak Street Southbound |        |      | Chestnut Street Eastbound |       |        | Chestnut Street Westbound |      |       |
|------------|-----------------------|------|------|-----------------------|--------|------|---------------------------|-------|--------|---------------------------|------|-------|
|            | U-Turn                | Left | Thru | Right                 | U-Turn | Left | Thru                      | Right | U-Turn | Left                      | Thru | Right |
| 11:00 AM   | 1                     | 36   | 27   | 7                     | 0      | 0    | 22                        | 4     | 0      | 9                         | 2    | 104   |
| 11:15 AM   | 0                     | 39   | 29   | 9                     | 0      | 1    | 24                        | 4     | 0      | 8                         | 4    | 101   |
| 11:30 AM   | 0                     | 45   | 30   | 8                     | 0      | 2    | 26                        | 5     | 0      | 7                         | 3    | 89    |
| 11:45 AM   | 0                     | 49   | 30   | 7                     | 0      | 1    | 25                        | 6     | 0      | 6                         | 5    | 85    |
| 12:00 PM   | 0                     | 56   | 29   | 9                     | 0      | 1    | 27                        | 7     | 0      | 5                         | 3    | 69    |
| 12:15 PM   | 0                     | 58   | 26   | 8                     | 0      | 1    | 26                        | 6     | 0      | 6                         | 3    | 76    |
| 12:30 PM   | 0                     | 57   | 21   | 6                     | 0      | 0    | 24                        | 4     | 0      | 5                         | 2    | 77    |
| 12:45 PM   | 0                     | 53   | 18   | 5                     | 0      | 1    | 27                        | 5     | 0      | 6                         | 4    | 81    |
| 1:00 PM    | 0                     | 52   | 15   | 4                     | 0      | 2    | 30                        | 6     | 0      | 4                         | 3    | 81    |
| 1:15 AM    | 0                     | 49   | 16   | 6                     | 0      | 0    | 29                        | 4     | 0      | 5                         | 4    | 85    |
| 1:30 AM    | 0                     | 47   | 17   | 5                     | 0      | 1    | 27                        | 5     | 0      | 4                         | 3    | 81    |
| 1:45 AM    | 0                     | 40   | 18   | 6                     | 0      | 1    | 28                        | 4     | 0      | 5                         | 3    | 79    |

| SAT PEAK HOUR<br>11:00 AM<br>to<br>12:00 PM |        | Oak Street<br>Northbound |      |       |        | Oak Street<br>Southbound |      |       |        | Chestnut Street<br>Eastbound |      |       |        | Chestnut Street<br>Westbound |      |       |  |
|---------------------------------------------|--------|--------------------------|------|-------|--------|--------------------------|------|-------|--------|------------------------------|------|-------|--------|------------------------------|------|-------|--|
| PHF<br>HV %                                 | U-Turn | Left                     | Thru | Right | U-Turn | Left                     | Thru | Right | U-Turn | Left                         | Thru | Right | U-Turn | Left                         | Thru | Right |  |
|                                             | 1      | 169                      | 116  | 31    | 0      | 4                        | 97   | 19    | 0      | 30                           | 14   | 379   | 0      | 15                           | 3    | 2     |  |
|                                             | 0.92   |                          |      |       | 0.91   |                          |      |       | 0.92   |                              |      |       | 0.83   |                              |      |       |  |
|                                             | 0.0%   | 0.0%                     | 0.0% | 0.0%  | 0.0%   | 0.0%                     | 0.0% | 0.0%  | 0.0%   | 0.0%                         | 0.0% | 0.8%  | 0.0%   | 0.0%                         | 0.0% | 0.0%  |  |

11/10/2017, 3:32 PM, 12239.00\_127\_018\_TMC\_Loc 4 (Saturday)

Client: Matt Duranleau  
Project #: 12239.00\_127\_018\_VHB  
BTD #: Location 4  
Location: Newton, MA  
Street 1: Chestnut Street  
Street 2: Oak Street  
Count Date: 10/28/2017  
Day of Week: Saturday  
Weather: Sun w/ Clouds, 65°F



**TRUCKS**

| Start Time | Oak Street Northbound |      |      | Oak Street Southbound |        |      | Chestnut Street Eastbound |       |        | Chestnut Street Westbound |      |       |
|------------|-----------------------|------|------|-----------------------|--------|------|---------------------------|-------|--------|---------------------------|------|-------|
|            | U-Turn                | Left | Thru | Right                 | U-Turn | Left | Thru                      | Right | U-Turn | Left                      | Thru | Right |
| 11:00 AM   | 0                     | 0    | 0    | 0                     | 0      | 0    | 0                         | 0     | 0      | 0                         | 0    | 0     |
| 11:15 AM   | 0                     | 0    | 0    | 0                     | 0      | 0    | 0                         | 0     | 0      | 0                         | 0    | 0     |
| 11:30 AM   | 0                     | 0    | 0    | 0                     | 0      | 0    | 0                         | 0     | 0      | 0                         | 0    | 0     |
| 11:45 AM   | 0                     | 0    | 0    | 0                     | 0      | 0    | 0                         | 0     | 0      | 0                         | 1    | 0     |
| 12:00 PM   | 0                     | 1    | 1    | 0                     | 0      | 0    | 0                         | 0     | 0      | 0                         | 0    | 0     |
| 12:15 PM   | 0                     | 0    | 0    | 0                     | 0      | 0    | 0                         | 0     | 0      | 0                         | 0    | 0     |
| 12:30 PM   | 0                     | 1    | 0    | 0                     | 0      | 0    | 0                         | 0     | 0      | 0                         | 0    | 0     |
| 12:45 PM   | 0                     | 0    | 0    | 0                     | 0      | 0    | 0                         | 0     | 0      | 0                         | 0    | 0     |
| 1:00 PM    | 0                     | 0    | 0    | 0                     | 0      | 0    | 1                         | 1     | 0      | 1                         | 0    | 0     |
| 1:15 AM    | 0                     | 1    | 0    | 0                     | 0      | 0    | 0                         | 0     | 0      | 0                         | 1    | 0     |
| 1:30 AM    | 0                     | 0    | 0    | 0                     | 0      | 0    | 1                         | 0     | 0      | 0                         | 1    | 0     |
| 1:45 AM    | 0                     | 0    | 0    | 0                     | 0      | 0    | 0                         | 0     | 0      | 0                         | 0    | 0     |

| SAT PEAK HOUR       |        | Oak Street Northbound |      |       |        | Oak Street Southbound |      |       |        | Chestnut Street Eastbound |      |       |        | Chestnut Street Westbound |      |       |  |
|---------------------|--------|-----------------------|------|-------|--------|-----------------------|------|-------|--------|---------------------------|------|-------|--------|---------------------------|------|-------|--|
| 12:45 PM<br>1:45 AM | U-Turn | Left                  | Thru | Right | U-Turn | Left                  | Thru | Right | U-Turn | Left                      | Thru | Right | U-Turn | Left                      | Thru | Right |  |
|                     | 0      | 1                     | 0    | 0     | 0      | 0                     | 2    | 1     | 0      | 1                         | 0    | 0     | 0      | 0                         | 0    | 0     |  |
| PHF                 | 0.25   |                       |      |       | 0.38   |                       |      |       | 0.75   |                           |      |       | 0.00   |                           |      |       |  |

11/10/2017, 3:32 PM, 12239.00\_127\_018\_TMC\_Loc 4 (Saturday)

Client: Matt Duranleau  
Project #: 12239.00\_127\_018\_VHB  
BTD #: Location 4  
Location: Newton, MA  
Street 1: Chestnut Street  
Street 2: Oak Street  
Count Date: 10/26/2017  
Day of Week: Saturday  
Weather: Sun w/ Clouds, 65°F



PEDESTRIANS & BICYCLES

| Oak Street Northbound |      |      |       | Oak Street Southbound |      |      |       | Chestnut Street Eastbound |      |      |       | Chestnut Street Westbound |      |      |       |     |
|-----------------------|------|------|-------|-----------------------|------|------|-------|---------------------------|------|------|-------|---------------------------|------|------|-------|-----|
| Start Time            | Left | Thru | Right | PED                   | Left | Thru | Right | PED                       | Left | Thru | Right | PED                       | Left | Thru | Right | PED |
| 11:00 AM              | 1    | 0    | 0     | 2                     | 0    | 1    | 0     | 0                         | 0    | 0    | 0     | 6                         | 0    | 0    | 1     | 0   |
| 11:15 AM              | 0    | 0    | 0     | 0                     | 0    | 0    | 0     | 2                         | 0    | 0    | 0     | 1                         | 0    | 0    | 0     | 2   |
| 11:30 AM              | 0    | 0    | 0     | 1                     | 0    | 0    | 0     | 0                         | 0    | 0    | 0     | 1                         | 0    | 0    | 0     | 0   |
| 11:45 AM              | 0    | 0    | 0     | 0                     | 0    | 0    | 0     | 0                         | 0    | 0    | 0     | 0                         | 0    | 0    | 0     | 0   |
| 12:00 PM              | 0    | 0    | 1     | 1                     | 0    | 0    | 0     | 1                         | 0    | 0    | 1     | 3                         | 0    | 0    | 0     | 4   |
| 12:15 PM              | 0    | 0    | 0     | 2                     | 0    | 0    | 0     | 0                         | 0    | 0    | 2     | 0                         | 1    | 0    | 1     | 0   |
| 12:30 PM              | 0    | 0    | 0     | 0                     | 0    | 0    | 0     | 1                         | 0    | 0    | 0     | 0                         | 0    | 0    | 0     | 0   |
| 12:45 PM              | 0    | 0    | 0     | 0                     | 0    | 0    | 0     | 0                         | 0    | 0    | 2     | 0                         | 0    | 0    | 1     | 0   |
| 1:00 PM               | 0    | 0    | 0     | 1                     | 0    | 0    | 0     | 0                         | 0    | 0    | 2     | 0                         | 0    | 0    | 0     | 5   |
| 1:15 AM               | 0    | 0    | 0     | 0                     | 0    | 0    | 0     | 2                         | 0    | 0    | 0     | 2                         | 0    | 0    | 0     | 0   |
| 1:30 AM               | 0    | 0    | 0     | 3                     | 0    | 1    | 0     | 1                         | 0    | 0    | 0     | 7                         | 0    | 0    | 2     | 0   |
| 1:45 AM               | 0    | 0    | 0     | 0                     | 0    | 1    | 0     | 0                         | 0    | 0    | 0     | 1                         | 0    | 0    | 0     | 0   |

| SAT PEAK HOUR | Oak Street Northbound |      |       |     | Oak Street Southbound |      |       |     | Chestnut Street Eastbound |      |       |     | Chestnut Street Westbound |      |       |     |
|---------------|-----------------------|------|-------|-----|-----------------------|------|-------|-----|---------------------------|------|-------|-----|---------------------------|------|-------|-----|
|               | Left                  | Thru | Right | PED | Left                  | Thru | Right | PED | Left                      | Thru | Right | PED | Left                      | Thru | Right | PED |
|               | 11:00 AM              | 0    | 0     | 0   | 3                     | 0    | 1     | 0   | 2                         | 0    | 0     | 0   | 8                         | 0    | 1     | 0   |
| 12:00 PM      | 1                     | 0    | 0     | 3   | 0                     | 1    | 0     | 2   | 0                         | 0    | 0     | 8   | 0                         | 1    | 0     | 2   |

Peak hours corresponds to vehicular peak hours.

Client: Matt Duranleau  
Project #: 12239.00\_127\_018\_VHB  
BTD #: Location 5  
Location: Newton, MA  
Street 1: Oak Street  
Street 2: Old Clarks Driveway  
Count Date: 10/26/2017  
Day of Week: Saturday  
Weather: Sun w/ Clouds, 65°F



TOTAL (CARS & TRUCKS)

| Oak Street     |        |      |      |            |        |      |      | Oak Street     |        |      |      |            |        |      |      | Old Clarks Driveway |        |      |      |            |  |  |  |
|----------------|--------|------|------|------------|--------|------|------|----------------|--------|------|------|------------|--------|------|------|---------------------|--------|------|------|------------|--|--|--|
| Northwestbound |        |      |      | Southbound |        |      |      | Northwestbound |        |      |      | Southbound |        |      |      | Northwestbound      |        |      |      | Southbound |  |  |  |
| Start Time     | U-Turn | Left | Thru | Right      | U-Turn | Left | Thru | Right          | U-Turn | Left | Thru | Right      | U-Turn | Left | Thru | Right               | U-Turn | Left | Thru | Right      |  |  |  |
| 11:00 AM       | 0      | 0    | 70   | 0          | 0      | 0    | 129  | 0              | 0      | 0    | 0    | 0          | 0      | 0    | 0    | 0                   | 0      | 0    | 0    | 0          |  |  |  |
| 11:15 AM       | 0      | 0    | 76   | 0          | 0      | 0    | 128  | 0              | 0      | 0    | 0    | 0          | 0      | 0    | 0    | 0                   | 0      | 0    | 0    | 1          |  |  |  |
| 11:30 AM       | 0      | 0    | 82   | 0          | 1      | 0    | 120  | 0              | 0      | 0    | 0    | 0          | 0      | 0    | 0    | 0                   | 0      | 0    | 0    | 1          |  |  |  |
| 11:45 AM       | 0      | 0    | 86   | 1          | 0      | 2    | 112  | 0              | 0      | 0    | 0    | 0          | 0      | 0    | 0    | 0                   | 0      | 0    | 1    | 0          |  |  |  |
| 12:00 PM       | 0      | 0    | 92   | 1          | 0      | 4    | 98   | 0              | 0      | 0    | 0    | 0          | 0      | 0    | 3    | 0                   | 0      | 0    | 2    | 0          |  |  |  |
| 12:15 PM       | 0      | 0    | 91   | 0          | 0      | 1    | 105  | 0              | 0      | 0    | 0    | 0          | 0      | 0    | 2    | 0                   | 0      | 0    | 1    | 0          |  |  |  |
| 12:30 PM       | 0      | 0    | 84   | 0          | 0      | 0    | 106  | 0              | 0      | 0    | 0    | 0          | 0      | 0    | 0    | 0                   | 0      | 0    | 0    | 0          |  |  |  |
| 12:45 PM       | 0      | 0    | 76   | 1          | 0      | 0    | 113  | 0              | 0      | 0    | 0    | 0          | 0      | 0    | 0    | 0                   | 0      | 0    | 0    | 0          |  |  |  |
| 1:00 PM        | 0      | 0    | 71   | 0          | 0      | 0    | 117  | 0              | 0      | 0    | 0    | 0          | 0      | 0    | 0    | 0                   | 0      | 0    | 0    | 0          |  |  |  |
| 1:15 AM        | 0      | 0    | 70   | 0          | 0      | 0    | 118  | 0              | 0      | 0    | 0    | 0          | 0      | 0    | 0    | 0                   | 0      | 0    | 0    | 1          |  |  |  |
| 1:30 AM        | 0      | 0    | 69   | 0          | 0      | 1    | 112  | 0              | 0      | 0    | 0    | 0          | 0      | 0    | 0    | 0                   | 0      | 0    | 0    | 0          |  |  |  |
| 1:45 AM        | 0      | 0    | 63   | 0          | 0      | 1    | 110  | 0              | 0      | 0    | 0    | 0          | 0      | 0    | 0    | 0                   | 0      | 0    | 0    | 0          |  |  |  |

| SAT PEAK HOUR<br>11:15 AM<br>to<br>12:15 PM<br><br>PHF<br>HV % |  | Oak Street<br>Northwestbound |      |      |       | Oak Street<br>Southeastbound |      |      |       | Northeastbound |      |      |       | Old Clarks Driveway<br>Southwestbound |      |      |       |   |
|----------------------------------------------------------------|--|------------------------------|------|------|-------|------------------------------|------|------|-------|----------------|------|------|-------|---------------------------------------|------|------|-------|---|
|                                                                |  | U-Turn                       | Left | Thru | Right | U-Turn                       | Left | Thru | Right | U-Turn         | Left | Thru | Right | U-Turn                                | Left | Thru | Right |   |
|                                                                |  | 0                            | 0    | 0    | 336   | 2                            | 1    | 6    | 458   | 0              | 0    | 0    | 0     | 0                                     | 0    | 0    | 0     | 4 |
|                                                                |  | 0.91                         |      |      |       | 0.91                         |      |      |       | 0.00           |      |      |       | 0.40                                  |      |      |       |   |
|                                                                |  | 0.0%                         | 0.0% | 0.0% | 0.6%  | 0.0%                         | 0.0% | 0.0% | 0.2%  | 0.0%           | 0.0% | 0.0% | 0.0%  | 0.0%                                  | 0.0% | 0.0% | 0.0%  |   |

Client: Matt Duranleau  
Project #: 12239.00\_127\_018\_VHB  
BTD #: Location 5  
Location: Newton, MA  
Street 1: Oak Street  
Street 2: Old Clarks Driveway  
Count Date: 10/28/2017  
Day of Week: Saturday  
Weather: Sun w/ Clouds, 65°F



#### TRUCKS

| Start Time | Oak Street Northwestbound |      |      |       | Oak Street Southeastbound |      |      |       | Northeastbound |      |      |       | Old Clarks Driveway Southwestbound |      |      |       |
|------------|---------------------------|------|------|-------|---------------------------|------|------|-------|----------------|------|------|-------|------------------------------------|------|------|-------|
|            | U-Turn                    | Left | Thru | Right | U-Turn                    | Left | Thru | Right | U-Turn         | Left | Thru | Right | U-Turn                             | Left | Thru | Right |
| 11:00 AM   | 0                         | 0    | 0    | 0     | 0                         | 2    | 0    | 0     | 0              | 0    | 0    | 0     | 0                                  | 0    | 0    | 0     |
| 11:15 AM   | 0                         | 0    | 0    | 0     | 0                         | 0    | 0    | 0     | 0              | 0    | 0    | 0     | 0                                  | 0    | 0    | 0     |
| 11:30 AM   | 0                         | 0    | 0    | 0     | 0                         | 0    | 0    | 0     | 0              | 0    | 0    | 0     | 0                                  | 0    | 0    | 0     |
| 11:45 AM   | 0                         | 0    | 0    | 0     | 0                         | 0    | 0    | 0     | 0              | 0    | 0    | 0     | 0                                  | 0    | 0    | 0     |
| 12:00 PM   | 0                         | 0    | 2    | 0     | 0                         | 0    | 1    | 0     | 0              | 0    | 0    | 0     | 0                                  | 0    | 0    | 0     |
| 12:15 PM   | 0                         | 0    | 0    | 0     | 0                         | 0    | 0    | 0     | 0              | 0    | 0    | 0     | 0                                  | 0    | 0    | 0     |
| 12:30 PM   | 0                         | 0    | 1    | 0     | 0                         | 0    | 0    | 0     | 0              | 0    | 0    | 0     | 0                                  | 0    | 0    | 0     |
| 12:45 PM   | 0                         | 0    | 0    | 0     | 0                         | 1    | 0    | 0     | 0              | 0    | 0    | 0     | 0                                  | 0    | 0    | 0     |
| 1:00 PM    | 0                         | 0    | 0    | 0     | 0                         | 0    | 1    | 0     | 0              | 0    | 0    | 0     | 0                                  | 0    | 0    | 0     |
| 1:15 AM    | 0                         | 0    | 1    | 0     | 0                         | 0    | 1    | 0     | 0              | 0    | 0    | 0     | 0                                  | 0    | 0    | 0     |
| 1:30 AM    | 0                         | 0    | 0    | 0     | 0                         | 0    | 2    | 0     | 0              | 0    | 0    | 0     | 0                                  | 0    | 0    | 0     |
| 1:45 AM    | 0                         | 0    | 0    | 0     | 0                         | 0    | 0    | 0     | 0              | 0    | 0    | 0     | 0                                  | 0    | 0    | 0     |

| SAT PEAK HOUR<br>12:45 PM<br>to<br>1:45 AM | Oak Street Northwestbound |      |      |       | Oak Street Southeastbound |      |      |       | Northeastbound |      |      |       | Old Clarks Driveway Southwestbound |      |      |       |
|--------------------------------------------|---------------------------|------|------|-------|---------------------------|------|------|-------|----------------|------|------|-------|------------------------------------|------|------|-------|
|                                            | U-Turn                    | Left | Thru | Right | U-Turn                    | Left | Thru | Right | U-Turn         | Left | Thru | Right | U-Turn                             | Left | Thru | Right |
| PHF                                        | 0                         | 0    | 1    | 0     | 0                         | 0    | 5    | 0     | 0              | 0    | 0    | 0     | 0                                  | 0    | 0    | 0     |
|                                            | 0.25                      |      |      |       | 0.63                      |      |      |       | 0.00           |      |      |       | 0.00                               |      |      |       |

Client: Matt Duranleau  
Project #: 12239.00\_127\_018\_VHB  
BTD #: Location 5  
Location: Newton, MA  
Street 1: Oak Street  
Street 2: Old Clarks Driveway  
Count Date: 10/28/2017  
Day of Week: Saturday  
Weather: Sun w/ Clouds, 65°F



#### PEDESTRIANS & BICYCLES

| Start Time | Oak Street Northwestbound |      |       |     | Oak Street Southeastbound |      |       |     | Northeastbound |      |       |     | Old Clarks Driveway Southwestbound |      |       |     |
|------------|---------------------------|------|-------|-----|---------------------------|------|-------|-----|----------------|------|-------|-----|------------------------------------|------|-------|-----|
|            | Left                      | Thru | Right | PED | Left                      | Thru | Right | PED | Left           | Thru | Right | PED | Left                               | Thru | Right | PED |
| 11:00 AM   | 0                         | 1    | 0     | 0   | 0                         | 0    | 0     | 0   | 0              | 0    | 0     | 0   | 0                                  | 0    | 0     | 2   |
| 11:15 AM   | 0                         | 0    | 0     | 0   | 0                         | 0    | 0     | 0   | 0              | 0    | 0     | 0   | 0                                  | 0    | 0     | 0   |
| 11:30 AM   | 0                         | 0    | 0     | 0   | 0                         | 0    | 0     | 0   | 0              | 0    | 0     | 0   | 0                                  | 0    | 0     | 0   |
| 11:45 AM   | 0                         | 0    | 0     | 0   | 0                         | 0    | 0     | 0   | 0              | 0    | 0     | 0   | 0                                  | 0    | 0     | 1   |
| 12:00 PM   | 0                         | 0    | 0     | 0   | 0                         | 0    | 0     | 0   | 0              | 0    | 0     | 0   | 0                                  | 0    | 0     | 0   |
| 12:15 PM   | 0                         | 0    | 0     | 0   | 0                         | 0    | 0     | 0   | 0              | 0    | 0     | 0   | 0                                  | 0    | 0     | 3   |
| 12:30 PM   | 0                         | 0    | 0     | 0   | 0                         | 0    | 0     | 1   | 0              | 0    | 0     | 0   | 0                                  | 0    | 0     | 1   |
| 12:45 PM   | 0                         | 0    | 0     | 0   | 0                         | 0    | 0     | 1   | 0              | 0    | 0     | 0   | 0                                  | 0    | 0     | 1   |
| 1:00 PM    | 0                         | 0    | 0     | 0   | 0                         | 0    | 0     | 0   | 0              | 0    | 0     | 0   | 0                                  | 0    | 0     | 1   |
| 1:15 AM    | 0                         | 0    | 0     | 0   | 0                         | 0    | 0     | 0   | 0              | 0    | 0     | 0   | 0                                  | 0    | 0     | 1   |
| 1:30 AM    | 0                         | 0    | 0     | 0   | 0                         | 0    | 0     | 0   | 0              | 0    | 0     | 0   | 0                                  | 0    | 0     | 3   |
| 1:45 AM    | 0                         | 0    | 0     | 0   | 0                         | 0    | 0     | 0   | 0              | 0    | 0     | 0   | 0                                  | 0    | 0     | 3   |

| SAT PEAK HOUR <sup>1</sup><br>12:15 AM<br>to<br>12:15 PM | Oak Street Northwestbound |      |       |     | Oak Street Southeastbound |      |       |     | Northeastbound |      |       |     | Old Clarks Driveway Southwestbound |      |       |     |
|----------------------------------------------------------|---------------------------|------|-------|-----|---------------------------|------|-------|-----|----------------|------|-------|-----|------------------------------------|------|-------|-----|
|                                                          | Left                      | Thru | Right | PED | Left                      | Thru | Right | PED | Left           | Thru | Right | PED | Left                               | Thru | Right | PED |
|                                                          | 0                         | 0    | 0     | 0   | 0                         | 0    | 0     | 0   | 0              | 0    | 0     | 0   | 0                                  | 0    | 0     | 1   |

<sup>1</sup> Peak hours corresponds to vehicular peak hours.

Client: Matt Duranleau  
Project #: 12239.00\_127\_018\_VHB  
BTD #: Location 6  
Location: Newton, MA  
Street 1: Needham Street  
Street 2: Mill Driveway  
Count Date: 10/28/2017  
Day of Week: Saturday  
Weather: Sun w/ Clouds, 65°F



**TOTAL (CARS & TRUCKS)**

| Start Time | Needham Street Northbound |      |      |       | Needham Street Southbound |      |      |       | Mill Driveway Eastbound |      |      |       | Westbound |      |      |       |
|------------|---------------------------|------|------|-------|---------------------------|------|------|-------|-------------------------|------|------|-------|-----------|------|------|-------|
|            | U-Turn                    | Left | Thru | Right | U-Turn                    | Left | Thru | Right | U-Turn                  | Left | Thru | Right | U-Turn    | Left | Thru | Right |
| 11:00 AM   | 0                         | 0    | 236  | 0     | 1                         | 0    | 211  | 0     | 0                       | 0    | 0    | 0     | 0         | 0    | 0    | 0     |
| 11:15 AM   | 0                         | 0    | 201  | 0     | 0                         | 0    | 209  | 0     | 0                       | 0    | 0    | 0     | 0         | 0    | 0    | 0     |
| 11:30 AM   | 0                         | 0    | 216  | 0     | 0                         | 0    | 208  | 0     | 0                       | 0    | 0    | 0     | 0         | 0    | 0    | 0     |
| 11:45 AM   | 0                         | 0    | 194  | 0     | 0                         | 0    | 206  | 0     | 0                       | 0    | 0    | 0     | 0         | 0    | 0    | 0     |
| 12:00 PM   | 0                         | 0    | 217  | 0     | 0                         | 0    | 188  | 0     | 0                       | 0    | 0    | 0     | 0         | 0    | 0    | 0     |
| 12:15 PM   | 0                         | 0    | 221  | 0     | 0                         | 0    | 210  | 0     | 0                       | 0    | 0    | 0     | 0         | 0    | 0    | 0     |
| 12:30 PM   | 0                         | 0    | 205  | 0     | 0                         | 0    | 187  | 1     | 0                       | 1    | 0    | 0     | 0         | 0    | 0    | 0     |
| 12:45 PM   | 0                         | 0    | 194  | 0     | 0                         | 0    | 182  | 0     | 0                       | 0    | 0    | 0     | 0         | 0    | 0    | 0     |
| 1:00 PM    | 0                         | 0    | 217  | 0     | 0                         | 0    | 208  | 0     | 0                       | 0    | 0    | 0     | 0         | 0    | 0    | 0     |
| 1:15 AM    | 0                         | 0    | 206  | 0     | 0                         | 0    | 191  | 0     | 0                       | 0    | 0    | 0     | 0         | 0    | 0    | 0     |
| 1:30 AM    | 0                         | 0    | 213  | 0     | 0                         | 0    | 200  | 0     | 0                       | 0    | 0    | 0     | 0         | 0    | 0    | 0     |
| 1:45 AM    | 0                         | 0    | 221  | 0     | 0                         | 0    | 191  | 0     | 0                       | 0    | 0    | 0     | 0         | 0    | 0    | 0     |

| SAT PEAK HOUR<br>11:00 AM<br>to<br>12:00 PM | Needham Street Northbound |      |      |       | Needham Street Southbound |      |      |       | Mill Driveway Eastbound |      |      |       | Westbound |      |      |       |
|---------------------------------------------|---------------------------|------|------|-------|---------------------------|------|------|-------|-------------------------|------|------|-------|-----------|------|------|-------|
|                                             | U-Turn                    | Left | Thru | Right | U-Turn                    | Left | Thru | Right | U-Turn                  | Left | Thru | Right | U-Turn    | Left | Thru | Right |
|                                             | 0                         | 0    | 847  | 0     | 1                         | 0    | 834  | 0     | 0                       | 0    | 0    | 0     | 0         | 0    | 0    | 0     |
| PHF                                         | 0.90                      |      |      |       | 0.98                      |      |      |       | 0.00                    |      |      |       | 0.00      |      |      |       |
| HV %                                        | 0.0%                      | 0.0% | 0.6% | 0.0%  | 0.0%                      | 0.0% | 0.4% | 0.0%  | 0.0%                    | 0.0% | 0.0% | 0.0%  | 0.0%      | 0.0% | 0.0% | 0.0%  |

11/10/2017, 3:53 PM, 12239.00\_127\_018\_TMC\_Loc 6 (Saturday)

Client: Matt Duranleau  
Project #: 12239.00\_127\_018\_VHB  
BTD #: Location 6  
Location: Newton, MA  
Street 1: Needham Street  
Street 2: Mill Driveway  
Count Date: 10/28/2017  
Day of Week: Saturday  
Weather: Sun w/ Clouds, 65°F



**TRUCKS**

| Start Time | Needham Street Northbound |      |      |       | Needham Street Southbound |      |      |       | Mill Driveway Eastbound |      |      |       | Westbound |      |      |       |
|------------|---------------------------|------|------|-------|---------------------------|------|------|-------|-------------------------|------|------|-------|-----------|------|------|-------|
|            | U-Turn                    | Left | Thru | Right | U-Turn                    | Left | Thru | Right | U-Turn                  | Left | Thru | Right | U-Turn    | Left | Thru | Right |
| 11:00 AM   | 0                         | 0    | 4    | 0     | 0                         | 0    | 0    | 0     | 0                       | 0    | 0    | 0     | 0         | 0    | 0    | 0     |
| 11:15 AM   | 0                         | 0    | 0    | 0     | 0                         | 0    | 2    | 0     | 0                       | 0    | 0    | 0     | 0         | 0    | 0    | 0     |
| 11:30 AM   | 0                         | 0    | 1    | 0     | 0                         | 0    | 0    | 0     | 0                       | 0    | 0    | 0     | 0         | 0    | 0    | 0     |
| 11:45 AM   | 0                         | 0    | 0    | 0     | 0                         | 0    | 1    | 0     | 0                       | 0    | 0    | 0     | 0         | 0    | 0    | 0     |
| 12:00 PM   | 0                         | 0    | 1    | 0     | 0                         | 0    | 1    | 0     | 0                       | 0    | 0    | 0     | 0         | 0    | 0    | 0     |
| 12:15 PM   | 0                         | 0    | 1    | 0     | 0                         | 0    | 2    | 0     | 0                       | 0    | 0    | 0     | 0         | 0    | 0    | 0     |
| 12:30 PM   | 0                         | 0    | 0    | 0     | 0                         | 0    | 0    | 0     | 0                       | 0    | 0    | 0     | 0         | 0    | 0    | 0     |
| 12:45 PM   | 0                         | 0    | 0    | 0     | 0                         | 0    | 1    | 0     | 0                       | 0    | 0    | 0     | 0         | 0    | 0    | 0     |
| 1:00 PM    | 0                         | 0    | 0    | 0     | 0                         | 0    | 1    | 0     | 0                       | 0    | 0    | 0     | 0         | 0    | 0    | 0     |
| 1:15 AM    | 0                         | 0    | 1    | 0     | 0                         | 0    | 0    | 0     | 0                       | 0    | 0    | 0     | 0         | 0    | 0    | 0     |
| 1:30 AM    | 0                         | 0    | 0    | 0     | 0                         | 0    | 0    | 0     | 0                       | 0    | 0    | 0     | 0         | 0    | 0    | 0     |
| 1:45 AM    | 0                         | 0    | 0    | 0     | 0                         | 0    | 0    | 0     | 0                       | 0    | 0    | 0     | 0         | 0    | 0    | 0     |

| SAT PEAK HOUR<br>11:00 AM<br>to<br>12:00 PM | Needham Street Northbound |      |      |       | Needham Street Southbound |      |      |       | Mill Driveway Eastbound |      |      |       | Westbound |      |      |       |
|---------------------------------------------|---------------------------|------|------|-------|---------------------------|------|------|-------|-------------------------|------|------|-------|-----------|------|------|-------|
|                                             | U-Turn                    | Left | Thru | Right | U-Turn                    | Left | Thru | Right | U-Turn                  | Left | Thru | Right | U-Turn    | Left | Thru | Right |
|                                             | 0                         | 0    | 5    | 0     | 0                         | 0    | 3    | 0     | 0                       | 0    | 0    | 0     | 0         | 0    | 0    | 0     |
| PHF                                         | 0.31                      |      |      |       | 0.38                      |      |      |       | 0.00                    |      |      |       | 0.00      |      |      |       |

11/10/2017, 3:53 PM, 12239.00\_127\_018\_TMC\_Loc 6 (Saturday)

Client: Matt Duranleau  
Project #: 12239.00\_127\_018\_VHB  
BTD #: Location 6  
Location: Newton, MA  
Street 1: Needham Street  
Street 2: Mill Driveway  
Count Date: 10/26/2017  
Day of Week: Saturday  
Weather: Sun w/ Clouds, 65°F



PEDESTRIANS & BICYCLES

| Needham Street Northbound |      |      |       |     | Needham Street Southbound |      |       |     |      | Mill Driveway Eastbound |       |     |      |      | Westbound |     |      |      |       |
|---------------------------|------|------|-------|-----|---------------------------|------|-------|-----|------|-------------------------|-------|-----|------|------|-----------|-----|------|------|-------|
| Start Time                | Left | Thru | Right | PED | Left                      | Thru | Right | PED | Left | Thru                    | Right | PED | Left | Thru | Right     | PED | Left | Thru | Right |
| 11:00 AM                  | 0    | 1    | 0     | 0   | 0                         | 0    | 0     | 0   | 0    | 0                       | 0     | 3   | 0    | 0    | 0         | 0   | 0    | 0    | 0     |
| 11:15 AM                  | 0    | 0    | 0     | 0   | 0                         | 0    | 0     | 0   | 0    | 0                       | 0     | 4   | 0    | 0    | 0         | 0   | 0    | 0    | 0     |
| 11:30 AM                  | 0    | 0    | 0     | 0   | 0                         | 1    | 0     | 0   | 0    | 0                       | 0     | 2   | 0    | 0    | 0         | 0   | 0    | 0    | 0     |
| 11:45 AM                  | 0    | 0    | 0     | 0   | 0                         | 0    | 0     | 0   | 0    | 0                       | 0     | 1   | 0    | 0    | 0         | 0   | 0    | 0    | 0     |
| 12:00 PM                  | 0    | 3    | 0     | 0   | 0                         | 0    | 0     | 0   | 0    | 0                       | 0     | 3   | 0    | 0    | 0         | 0   | 0    | 0    | 0     |
| 12:15 PM                  | 0    | 0    | 0     | 0   | 0                         | 0    | 0     | 0   | 0    | 0                       | 0     | 4   | 0    | 0    | 0         | 0   | 0    | 0    | 0     |
| 12:30 PM                  | 0    | 0    | 0     | 0   | 0                         | 1    | 0     | 0   | 0    | 0                       | 0     | 2   | 0    | 0    | 0         | 0   | 0    | 0    | 0     |
| 12:45 PM                  | 0    | 0    | 0     | 0   | 0                         | 0    | 0     | 0   | 0    | 0                       | 0     | 0   | 0    | 0    | 0         | 0   | 0    | 0    | 0     |
| 1:00 PM                   | 0    | 1    | 0     | 0   | 0                         | 0    | 0     | 0   | 0    | 0                       | 0     | 2   | 1    | 0    | 0         | 0   | 0    | 0    | 0     |
| 1:15 AM                   | 0    | 0    | 0     | 0   | 0                         | 0    | 0     | 0   | 0    | 0                       | 0     | 0   | 0    | 0    | 0         | 0   | 0    | 0    | 0     |
| 1:30 AM                   | 0    | 0    | 0     | 0   | 0                         | 0    | 0     | 0   | 0    | 0                       | 0     | 3   | 0    | 0    | 0         | 0   | 0    | 0    | 0     |
| 1:45 AM                   | 0    | 0    | 0     | 0   | 0                         | 0    | 0     | 0   | 0    | 0                       | 0     | 1   | 0    | 0    | 0         | 0   | 0    | 0    | 0     |

| Needham Street Northbound |      |      |       |     | Needham Street Southbound |      |       |     |      | Mill Driveway Eastbound |       |     |      |      | Westbound |     |      |      |       |
|---------------------------|------|------|-------|-----|---------------------------|------|-------|-----|------|-------------------------|-------|-----|------|------|-----------|-----|------|------|-------|
| Start Time                | Left | Thru | Right | PED | Left                      | Thru | Right | PED | Left | Thru                    | Right | PED | Left | Thru | Right     | PED | Left | Thru | Right |
| 11:00 AM to 12:00 PM      | 0    | 1    | 0     | 0   | 0                         | 1    | 0     | 0   | 0    | 0                       | 0     | 10  | 0    | 0    | 0         | 0   | 0    | 0    | 0     |

Peak hours corresponds to vehicular peak hours.

Client: Matt Duranleau  
Project #: 12239.00\_127\_018\_VHB  
BTD #: Location 7  
Location: Newton, MA  
Street 1: Needham Street  
Street 2: TJ Driveway/Marshalls Drive South  
Count Date: 10/26/2017  
Day of Week: Saturday  
Weather: Sun w/ Clouds, 65°F



TOTAL (CARS & TRUCKS)

| Needham Street Northbound |        |      |      |       | Needham Street Southbound |      |      |       |        | Marshalls Driveway South |      |       |        |      | T.J. Maxx Driveway Westbound |       |        |      |      |
|---------------------------|--------|------|------|-------|---------------------------|------|------|-------|--------|--------------------------|------|-------|--------|------|------------------------------|-------|--------|------|------|
| Start Time                | U-Turn | Left | Thru | Right | U-Turn                    | Left | Thru | Right | U-Turn | Left                     | Thru | Right | U-Turn | Left | Thru                         | Right | U-Turn | Left | Thru |
| 11:00 AM                  | 0      | 16   | 218  | 2     | 0                         | 1    | 187  | 1     | 0      | 6                        | 0    | 24    | 0      | 0    | 0                            | 1     | 0      | 0    | 0    |
| 11:15 AM                  | 0      | 18   | 180  | 3     | 0                         | 2    | 185  | 0     | 0      | 7                        | 0    | 23    | 0      | 1    | 0                            | 1     | 0      | 0    | 0    |
| 11:30 AM                  | 0      | 19   | 194  | 3     | 0                         | 1    | 182  | 1     | 0      | 5                        | 0    | 25    | 0      | 1    | 0                            | 2     | 0      | 0    | 0    |
| 11:45 AM                  | 0      | 21   | 169  | 4     | 0                         | 2    | 180  | 2     | 0      | 4                        | 0    | 26    | 0      | 0    | 0                            | 2     | 0      | 0    | 0    |
| 12:00 PM                  | 0      | 20   | 194  | 3     | 0                         | 3    | 162  | 2     | 0      | 2                        | 0    | 25    | 0      | 1    | 0                            | 1     | 0      | 0    | 0    |
| 12:15 PM                  | 0      | 22   | 197  | 2     | 0                         | 2    | 183  | 3     | 0      | 3                        | 0    | 27    | 0      | 0    | 0                            | 1     | 0      | 0    | 0    |
| 12:30 PM                  | 0      | 24   | 179  | 3     | 0                         | 4    | 161  | 1     | 0      | 3                        | 0    | 26    | 0      | 1    | 0                            | 3     | 0      | 0    | 0    |
| 12:45 PM                  | 0      | 27   | 163  | 4     | 0                         | 2    | 152  | 2     | 0      | 4                        | 0    | 29    | 0      | 1    | 0                            | 2     | 0      | 0    | 0    |
| 1:00 PM                   | 0      | 26   | 189  | 2     | 0                         | 3    | 179  | 3     | 0      | 2                        | 0    | 28    | 0      | 1    | 0                            | 2     | 0      | 0    | 0    |
| 1:15 AM                   | 0      | 28   | 174  | 4     | 0                         | 1    | 162  | 2     | 0      | 3                        | 0    | 29    | 0      | 0    | 0                            | 1     | 0      | 0    | 0    |
| 1:30 AM                   | 0      | 27   | 183  | 3     | 0                         | 2    | 173  | 1     | 0      | 3                        | 0    | 27    | 0      | 0    | 0                            | 2     | 0      | 0    | 0    |
| 1:45 AM                   | 0      | 25   | 193  | 3     | 0                         | 2    | 164  | 2     | 0      | 4                        | 0    | 26    | 0      | 1    | 0                            | 1     | 0      | 0    | 0    |

| Needham Street Northbound |      |      |       |        | Needham Street Southbound |      |       |        |      | Marshalls Driveway South |       |        |      |      | T.J. Maxx Driveway Westbound |        |      |      |       |
|---------------------------|------|------|-------|--------|---------------------------|------|-------|--------|------|--------------------------|-------|--------|------|------|------------------------------|--------|------|------|-------|
| U-Turn                    | Left | Thru | Right | U-Turn | Left                      | Thru | Right | U-Turn | Left | Thru                     | Right | U-Turn | Left | Thru | Right                        | U-Turn | Left | Thru | Right |
| 11:00 AM to 12:00 PM      | 0    | 74   | 761   | 12     | 0                         | 6    | 734   | 4      | 0    | 24                       | 0     | 98     | 0    | 2    | 0                            | 6      | 0    | 0    | 0     |
| PHF                       | 0.90 |      |       |        | 0.98                      |      |       |        | 0.95 |                          |       |        | 0.67 |      |                              |        |      |      |       |
| PH %                      | 0.0% | 0.0% | 0.7%  | 0.0%   | 0.0%                      | 0.0% | 0.4%  | 0.0%   | 0.0% | 0.0%                     | 0.0%  | 0.0%   | 0.0% | 0.0% | 0.0%                         | 0.0%   | 0.0% | 0.0% | 0.0%  |

Client: Matt Duranleau  
Project #: 12239.00\_127\_018\_VHB  
BTD #: Location 7  
Location: Newton, MA  
Street 1: Needham Street  
Street 2: TJ Driveway/Marshalls Drive South  
Count Date: 10/28/2017  
Day of Week: Saturday  
Weather: Sun w/ Clouds, 65°F



#### TRUCKS

| Start Time | Needham Street Northbound |      |      |       | Needham Street Southbound |      |      |       | Marshalls Driveway South Eastbound |      |      |       | T.J. Maxx Driveway Westbound |      |      |       |
|------------|---------------------------|------|------|-------|---------------------------|------|------|-------|------------------------------------|------|------|-------|------------------------------|------|------|-------|
|            | U-Turn                    | Left | Thru | Right | U-Turn                    | Left | Thru | Right | U-Turn                             | Left | Thru | Right | U-Turn                       | Left | Thru | Right |
| 11:00 AM   | 0                         | 0    | 3    | 0     | 0                         | 0    | 0    | 0     | 0                                  | 0    | 0    | 0     | 0                            | 0    | 0    | 0     |
| 11:15 AM   | 0                         | 0    | 1    | 0     | 0                         | 0    | 2    | 0     | 0                                  | 0    | 0    | 0     | 0                            | 0    | 0    | 0     |
| 11:30 AM   | 0                         | 0    | 1    | 0     | 0                         | 0    | 0    | 0     | 0                                  | 0    | 0    | 0     | 0                            | 0    | 0    | 0     |
| 11:45 AM   | 0                         | 0    | 0    | 0     | 0                         | 1    | 0    | 0     | 0                                  | 0    | 0    | 0     | 0                            | 0    | 0    | 0     |
| 12:00 PM   | 0                         | 0    | 1    | 0     | 0                         | 1    | 0    | 0     | 0                                  | 0    | 0    | 0     | 0                            | 0    | 0    | 0     |
| 12:15 PM   | 0                         | 0    | 0    | 0     | 0                         | 2    | 0    | 0     | 0                                  | 0    | 0    | 0     | 0                            | 0    | 0    | 0     |
| 12:30 PM   | 0                         | 0    | 1    | 0     | 0                         | 1    | 0    | 0     | 0                                  | 0    | 0    | 0     | 0                            | 0    | 0    | 0     |
| 12:45 PM   | 0                         | 0    | 0    | 0     | 0                         | 0    | 0    | 0     | 0                                  | 0    | 0    | 0     | 0                            | 0    | 0    | 0     |
| 1:00 PM    | 0                         | 0    | 0    | 0     | 0                         | 1    | 0    | 0     | 0                                  | 0    | 0    | 0     | 0                            | 0    | 0    | 0     |
| 1:15 AM    | 0                         | 0    | 1    | 0     | 0                         | 0    | 0    | 0     | 0                                  | 0    | 0    | 0     | 0                            | 0    | 0    | 0     |
| 1:30 AM    | 0                         | 0    | 0    | 0     | 0                         | 0    | 0    | 0     | 0                                  | 0    | 0    | 0     | 0                            | 0    | 0    | 0     |
| 1:45 AM    | 0                         | 0    | 0    | 0     | 0                         | 0    | 0    | 0     | 0                                  | 0    | 0    | 0     | 0                            | 0    | 0    | 0     |

| SAT PEAK HOUR<br>11:00 AM<br>to<br>12:00 PM | Needham Street Northbound |      |      |       | Needham Street Southbound |      |      |       | Marshalls Driveway South Eastbound |      |      |       | T.J. Maxx Driveway Westbound |      |      |       |
|---------------------------------------------|---------------------------|------|------|-------|---------------------------|------|------|-------|------------------------------------|------|------|-------|------------------------------|------|------|-------|
|                                             | U-Turn                    | Left | Thru | Right | U-Turn                    | Left | Thru | Right | U-Turn                             | Left | Thru | Right | U-Turn                       | Left | Thru | Right |
| PHF                                         | 0                         | 0    | 5    | 0     | 0                         | 0    | 3    | 0     | 0                                  | 0    | 0    | 0     | 0                            | 0    | 0    | 0     |
|                                             | 0.42                      |      |      |       | 0.38                      |      |      |       | 0.00                               |      |      |       | 0.00                         |      |      |       |

Client: Matt Duranleau  
Project #: 12239.00\_127\_018\_VHB  
BTD #: Location 7  
Location: Newton, MA  
Street 1: Needham Street  
Street 2: TJ Driveway/Marshalls Drive South  
Count Date: 10/28/2017  
Day of Week: Saturday  
Weather: Sun w/ Clouds, 65°F



#### PEDESTRIANS & BICYCLES

| Start Time | Needham Street Northbound |      |       |     | Needham Street Southbound |      |       |     | Marshalls Driveway South Eastbound |      |       |     | T.J. Maxx Driveway Westbound |      |       |     |
|------------|---------------------------|------|-------|-----|---------------------------|------|-------|-----|------------------------------------|------|-------|-----|------------------------------|------|-------|-----|
|            | Left                      | Thru | Right | PED | Left                      | Thru | Right | PED | Left                               | Thru | Right | PED | Left                         | Thru | Right | PED |
| 11:00 AM   | 0                         | 1    | 0     | 1   | 0                         | 0    | 0     | 0   | 0                                  | 0    | 0     | 2   | 0                            | 0    | 0     | 1   |
| 11:15 AM   | 0                         | 0    | 0     | 0   | 0                         | 0    | 0     | 1   | 0                                  | 0    | 0     | 4   | 0                            | 0    | 0     | 1   |
| 11:30 AM   | 0                         | 0    | 0     | 0   | 0                         | 1    | 0     | 0   | 0                                  | 0    | 0     | 2   | 0                            | 0    | 0     | 0   |
| 11:45 AM   | 0                         | 0    | 0     | 0   | 0                         | 0    | 1     | 0   | 0                                  | 0    | 0     | 2   | 0                            | 0    | 0     | 7   |
| 12:00 PM   | 0                         | 3    | 0     | 1   | 0                         | 0    | 3     | 0   | 0                                  | 0    | 0     | 2   | 0                            | 0    | 0     | 3   |
| 12:15 PM   | 0                         | 0    | 0     | 0   | 0                         | 0    | 0     | 0   | 0                                  | 0    | 0     | 4   | 0                            | 0    | 0     | 2   |
| 12:30 PM   | 0                         | 0    | 0     | 0   | 0                         | 1    | 0     | 0   | 0                                  | 0    | 0     | 2   | 0                            | 0    | 0     | 2   |
| 12:45 PM   | 0                         | 0    | 0     | 0   | 0                         | 0    | 1     | 0   | 0                                  | 0    | 0     | 1   | 0                            | 0    | 0     | 1   |
| 1:00 PM    | 0                         | 1    | 0     | 0   | 0                         | 0    | 0     | 0   | 0                                  | 0    | 0     | 1   | 0                            | 0    | 0     | 2   |
| 1:15 AM    | 0                         | 0    | 0     | 1   | 0                         | 0    | 0     | 0   | 0                                  | 0    | 0     | 2   | 0                            | 0    | 0     | 1   |
| 1:30 AM    | 0                         | 0    | 0     | 0   | 0                         | 0    | 0     | 0   | 0                                  | 0    | 0     | 1   | 0                            | 0    | 0     | 1   |
| 1:45 AM    | 0                         | 0    | 0     | 0   | 0                         | 0    | 0     | 0   | 0                                  | 0    | 0     | 1   | 0                            | 0    | 0     | 3   |

| SAT PEAK HOUR<br>11:00 AM<br>to<br>12:00 PM | Needham Street Northbound |      |       |     | Needham Street Southbound |      |       |     | Marshalls Driveway South Eastbound |      |       |     | T.J. Maxx Driveway Westbound |      |       |     |
|---------------------------------------------|---------------------------|------|-------|-----|---------------------------|------|-------|-----|------------------------------------|------|-------|-----|------------------------------|------|-------|-----|
|                                             | Left                      | Thru | Right | PED | Left                      | Thru | Right | PED | Left                               | Thru | Right | PED | Left                         | Thru | Right | PED |
|                                             | 0                         | 1    | 0     | 1   | 0                         | 1    | 0     | 2   | 0                                  | 0    | 0     | 10  | 0                            | 0    | 0     | 17  |

<sup>1</sup> Peak hours corresponds to vehicular peak hours.

Client: Matt Duranleau  
Project #: 12239.00\_127\_018\_VHB  
BTD #: Location 8  
Location: Newton, MA  
Street 1: Needham Street  
Street 2: Charlemont St/Marshalls Drive North  
Count Date: 10/28/2017  
Day of Week: Saturday  
Weather: Sun w/ Clouds, 65°F



**TOTAL (CARS & TRUCKS)**

| Start Time | Needham Street Northbound |      |      |       | Needham Street Southbound |      |      |       | Marshalls Driveway North Eastbound |      |      |       | Charlemont Street Westbound |      |      |       |
|------------|---------------------------|------|------|-------|---------------------------|------|------|-------|------------------------------------|------|------|-------|-----------------------------|------|------|-------|
|            | U-Turn                    | Left | Thru | Right | U-Turn                    | Left | Thru | Right | U-Turn                             | Left | Thru | Right | U-Turn                      | Left | Thru | Right |
| 11:00 AM   | 0                         | 14   | 210  | 3     | 0                         | 2    | 170  | 14    | 0                                  | 19   | 0    | 6     | 0                           | 13   | 0    | 6     |
| 11:15 AM   | 0                         | 11   | 172  | 5     | 0                         | 2    | 165  | 16    | 0                                  | 18   | 0    | 7     | 0                           | 15   | 0    | 7     |
| 11:30 AM   | 0                         | 8    | 187  | 6     | 0                         | 3    | 163  | 17    | 0                                  | 19   | 0    | 8     | 0                           | 13   | 1    | 9     |
| 11:45 AM   | 0                         | 9    | 162  | 4     | 0                         | 2    | 162  | 18    | 0                                  | 20   | 0    | 10    | 0                           | 12   | 1    | 8     |
| 12:00 PM   | 0                         | 9    | 163  | 5     | 0                         | 2    | 147  | 17    | 0                                  | 18   | 0    | 9     | 0                           | 11   | 1    | 9     |
| 12:15 PM   | 0                         | 8    | 187  | 6     | 0                         | 1    | 168  | 19    | 0                                  | 19   | 0    | 11    | 0                           | 9    | 0    | 7     |
| 12:30 PM   | 0                         | 7    | 174  | 4     | 0                         | 2    | 146  | 20    | 0                                  | 17   | 0    | 9     | 0                           | 11   | 0    | 8     |
| 12:45 PM   | 0                         | 6    | 158  | 5     | 0                         | 2    | 133  | 21    | 0                                  | 18   | 0    | 10    | 0                           | 13   | 1    | 6     |
| 1:00 PM    | 0                         | 5    | 185  | 3     | 0                         | 3    | 163  | 22    | 0                                  | 17   | 0    | 8     | 0                           | 14   | 1    | 8     |
| 1:15 AM    | 0                         | 5    | 168  | 5     | 0                         | 1    | 144  | 23    | 0                                  | 19   | 0    | 9     | 0                           | 12   | 0    | 7     |
| 1:30 AM    | 0                         | 4    | 180  | 4     | 0                         | 2    | 155  | 21    | 0                                  | 18   | 0    | 8     | 0                           | 13   | 1    | 9     |
| 1:45 AM    | 0                         | 5    | 188  | 5     | 0                         | 2    | 150  | 20    | 0                                  | 17   | 0    | 7     | 0                           | 11   | 0    | 8     |

| SAT PEAK HOUR<br>11:00 AM<br>to<br>12:00 PM | Needham Street Northbound |      |      |       | Needham Street Southbound |      |      |       | Marshalls Driveway North Eastbound |      |      |       | Charlemont Street Westbound |      |      |       |
|---------------------------------------------|---------------------------|------|------|-------|---------------------------|------|------|-------|------------------------------------|------|------|-------|-----------------------------|------|------|-------|
|                                             | U-Turn                    | Left | Thru | Right | U-Turn                    | Left | Thru | Right | U-Turn                             | Left | Thru | Right | U-Turn                      | Left | Thru | Right |
|                                             | 0                         | 42   | 731  | 18    | 0                         | 9    | 660  | 65    | 0                                  | 76   | 0    | 31    | 0                           | 63   | 2    | 30    |
| PHF                                         | 0.87                      |      |      |       | 0.99                      |      |      |       | 0.89                               |      |      |       | 0.92                        |      |      |       |
| HV %                                        | 0.0%                      | 0.0% | 0.7% | 0.0%  | 0.0%                      | 0.0% | 0.5% | 0.0%  | 0.0%                               | 0.0% | 0.0% | 0.0%  | 0.0%                        | 0.0% | 0.0% | 0.0%  |

11/10/2017, 4:10 PM, 12239.00\_127\_018\_TMC\_Loc 8 (Saturday)

Client: Matt Duranleau  
Project #: 12239.00\_127\_018\_VHB  
BTD #: Location 8  
Location: Newton, MA  
Street 1: Needham Street  
Street 2: Charlemont St/Marshalls Drive North  
Count Date: 10/28/2017  
Day of Week: Saturday  
Weather: Sun w/ Clouds, 65°F



**TRUCKS**

| Start Time | Needham Street Northbound |      |      |       | Needham Street Southbound |      |      |       | Marshalls Driveway North Eastbound |      |      |       | Charlemont Street Westbound |      |      |       |
|------------|---------------------------|------|------|-------|---------------------------|------|------|-------|------------------------------------|------|------|-------|-----------------------------|------|------|-------|
|            | U-Turn                    | Left | Thru | Right | U-Turn                    | Left | Thru | Right | U-Turn                             | Left | Thru | Right | U-Turn                      | Left | Thru | Right |
| 11:00 AM   | 0                         | 0    | 2    | 0     | 0                         | 0    | 1    | 0     | 0                                  | 0    | 0    | 0     | 0                           | 0    | 0    | 0     |
| 11:15 AM   | 0                         | 0    | 2    | 0     | 0                         | 0    | 1    | 0     | 0                                  | 0    | 0    | 0     | 0                           | 0    | 0    | 0     |
| 11:30 AM   | 0                         | 0    | 1    | 0     | 0                         | 0    | 0    | 0     | 0                                  | 0    | 0    | 0     | 0                           | 0    | 0    | 0     |
| 11:45 AM   | 0                         | 0    | 0    | 0     | 0                         | 0    | 1    | 0     | 0                                  | 0    | 0    | 0     | 0                           | 0    | 0    | 0     |
| 12:00 PM   | 0                         | 0    | 1    | 0     | 0                         | 0    | 1    | 0     | 0                                  | 0    | 0    | 0     | 0                           | 0    | 0    | 0     |
| 12:15 PM   | 0                         | 0    | 0    | 0     | 0                         | 0    | 1    | 0     | 0                                  | 0    | 0    | 0     | 0                           | 0    | 0    | 0     |
| 12:30 PM   | 0                         | 0    | 0    | 0     | 0                         | 0    | 2    | 0     | 0                                  | 0    | 0    | 0     | 0                           | 0    | 0    | 0     |
| 12:45 PM   | 0                         | 0    | 1    | 0     | 0                         | 0    | 0    | 0     | 0                                  | 0    | 0    | 0     | 0                           | 0    | 0    | 0     |
| 1:00 PM    | 0                         | 0    | 0    | 0     | 0                         | 0    | 1    | 0     | 0                                  | 0    | 0    | 0     | 0                           | 0    | 0    | 0     |
| 1:15 AM    | 0                         | 0    | 1    | 0     | 0                         | 0    | 0    | 0     | 0                                  | 0    | 0    | 0     | 0                           | 0    | 0    | 0     |
| 1:30 AM    | 0                         | 0    | 0    | 0     | 0                         | 0    | 0    | 0     | 0                                  | 0    | 0    | 0     | 0                           | 0    | 0    | 0     |
| 1:45 AM    | 0                         | 0    | 0    | 0     | 0                         | 0    | 0    | 0     | 0                                  | 0    | 0    | 0     | 0                           | 0    | 0    | 0     |

| SAT PEAK HOUR<br>11:00 AM<br>to<br>12:00 PM | Needham Street Northbound |      |      |       | Needham Street Southbound |      |      |       | Marshalls Driveway North Eastbound |      |      |       | Charlemont Street Westbound |      |      |       |
|---------------------------------------------|---------------------------|------|------|-------|---------------------------|------|------|-------|------------------------------------|------|------|-------|-----------------------------|------|------|-------|
|                                             | U-Turn                    | Left | Thru | Right | U-Turn                    | Left | Thru | Right | U-Turn                             | Left | Thru | Right | U-Turn                      | Left | Thru | Right |
|                                             | 0                         | 0    | 5    | 0     | 0                         | 0    | 3    | 0     | 0                                  | 0    | 0    | 0     | 0                           | 0    | 0    | 0     |
| PHF                                         | 0.63                      |      |      |       | 0.75                      |      |      |       | 0.00                               |      |      |       | 0.00                        |      |      |       |

11/10/2017, 4:10 PM, 12239.00\_127\_018\_TMC\_Loc 8 (Saturday)

Client: Matt Duranleau  
Project #: 12239.00\_127\_018\_VHB  
BTD #: Location 8  
Location: Newton, MA  
Street 1: Needham Street  
Street 2: Charlemont St/Marshalls Drive North  
Count Date: 10/26/2017  
Day of Week: Saturday  
Weather: Sun w/ Clouds, 65°F



PEDESTRIANS & BICYCLES

| Needham Street Northbound |      |      |       |     | Needham Street Southbound |      |       |     |      | Marshall's Driveway Northbound |       |     |      |      | Charlemont Street Westbound |     |  |  |  |
|---------------------------|------|------|-------|-----|---------------------------|------|-------|-----|------|--------------------------------|-------|-----|------|------|-----------------------------|-----|--|--|--|
| Start Time                | Left | Thru | Right | PED | Left                      | Thru | Right | PED | Left | Thru                           | Right | PED | Left | Thru | Right                       | PED |  |  |  |
| 11:00 AM                  | 0    | 0    | 0     | 0   | 0                         | 0    | 0     | 0   | 0    | 0                              | 0     | 0   | 0    | 0    | 0                           | 0   |  |  |  |
| 11:15 AM                  | 0    | 0    | 0     | 0   | 0                         | 0    | 0     | 1   | 0    | 0                              | 0     | 5   | 0    | 0    | 0                           | 2   |  |  |  |
| 11:30 AM                  | 0    | 0    | 0     | 0   | 0                         | 1    | 0     | 0   | 0    | 0                              | 0     | 2   | 0    | 0    | 0                           | 6   |  |  |  |
| 11:45 AM                  | 0    | 0    | 0     | 0   | 0                         | 0    | 0     | 0   | 0    | 0                              | 0     | 3   | 0    | 0    | 0                           | 5   |  |  |  |
| 12:00 PM                  | 0    | 2    | 0     | 0   | 0                         | 0    | 0     | 0   | 0    | 0                              | 0     | 2   | 0    | 0    | 0                           | 1   |  |  |  |
| 12:15 PM                  | 0    | 1    | 0     | 0   | 0                         | 1    | 0     | 0   | 0    | 0                              | 0     | 3   | 0    | 0    | 0                           | 1   |  |  |  |
| 12:30 PM                  | 0    | 0    | 0     | 0   | 0                         | 0    | 0     | 0   | 0    | 0                              | 0     | 2   | 0    | 0    | 0                           | 2   |  |  |  |
| 12:45 PM                  | 0    | 0    | 0     | 0   | 0                         | 0    | 0     | 0   | 0    | 0                              | 0     | 0   | 0    | 0    | 0                           | 2   |  |  |  |
| 1:00 PM                   | 0    | 1    | 0     | 0   | 0                         | 0    | 0     | 0   | 0    | 0                              | 0     | 2   | 0    | 0    | 0                           | 3   |  |  |  |
| 1:15 AM                   | 0    | 0    | 0     | 0   | 0                         | 0    | 0     | 0   | 0    | 0                              | 0     | 1   | 0    | 0    | 0                           | 7   |  |  |  |
| 1:30 AM                   | 0    | 0    | 0     | 0   | 0                         | 0    | 0     | 0   | 0    | 0                              | 0     | 0   | 0    | 0    | 0                           | 1   |  |  |  |
| 1:45 AM                   | 0    | 0    | 0     | 0   | 0                         | 0    | 0     | 0   | 0    | 0                              | 0     | 1   | 0    | 0    | 0                           | 2   |  |  |  |

| SAT PEAK HOUR              |  | Needham Street<br>Northbound |      |       |     | Needham Street<br>Southbound |      |       |     | Marshall's Driveway North<br>Eastbound |      |       |     | Charlemont Street<br>Westbound |      |       |     |
|----------------------------|--|------------------------------|------|-------|-----|------------------------------|------|-------|-----|----------------------------------------|------|-------|-----|--------------------------------|------|-------|-----|
|                            |  | Left                         | Thru | Right | PED | Left                         | Thru | Right | PED | Left                                   | Thru | Right | PED | Left                           | Thru | Right | PED |
|                            |  | 0                            | 1    | 0     | 0   | 0                            | 1    | 0     | 1   | 0                                      | 0    | 0     | 12  | 0                              | 0    | 0     | 14  |
| 11:00 AM<br>to<br>12:00 PM |  |                              |      |       |     |                              |      |       |     |                                        |      |       |     |                                |      |       |     |

<sup>1</sup> Peak hours corresponds to vehicular peak hours.

Client: Matt Duranleau  
Project #: 12239.00\_127\_018\_VHB  
BTD #: Location 11  
Location: Newton, MA  
Street 1: Needham Street  
Street 2: Jaconnet Street  
Count Date: 10/26/2017  
Day of Week: Saturday  
Weather: Sun w/ Clouds, 65°F



TOTAL (CARS & TRUCKS)

| Needham Street Northbound |        |      |      |       |        |      | Needham Street Southbound |       |        |      |      |       |        | Eastbound |      |       |        |      |      |       | Jaconnet Street Westbound |  |  |  |  |  |  |
|---------------------------|--------|------|------|-------|--------|------|---------------------------|-------|--------|------|------|-------|--------|-----------|------|-------|--------|------|------|-------|---------------------------|--|--|--|--|--|--|
| Start Time                | U-Turn | Left | Thru | Right | U-Turn | Left | Thru                      | Right | U-Turn | Left | Thru | Right | U-Turn | Left      | Thru | Right | U-Turn | Left | Thru | Right |                           |  |  |  |  |  |  |
| 11:00 AM                  | 0      | 0    | 245  | 7     | 0      | 2    | 166                       | 0     | 0      | 0    | 0    | 0     | 0      | 0         | 0    | 0     | 6      | 0    | 0    | 2     |                           |  |  |  |  |  |  |
| 11:15 AM                  | 0      | 0    | 205  | 8     | 0      | 3    | 162                       | 0     | 0      | 0    | 0    | 0     | 0      | 0         | 0    | 0     | 7      | 0    | 3    | 3     |                           |  |  |  |  |  |  |
| 11:30 AM                  | 0      | 0    | 223  | 6     | 0      | 3    | 163                       | 0     | 0      | 0    | 0    | 0     | 0      | 0         | 0    | 0     | 6      | 0    | 3    | 3     |                           |  |  |  |  |  |  |
| 11:45 AM                  | 0      | 0    | 193  | 7     | 0      | 4    | 158                       | 0     | 0      | 0    | 0    | 0     | 0      | 0         | 0    | 0     | 7      | 0    | 4    | 4     |                           |  |  |  |  |  |  |
| 12:00 PM                  | 0      | 0    | 214  | 6     | 0      | 2    | 143                       | 0     | 0      | 0    | 0    | 0     | 0      | 0         | 0    | 0     | 7      | 0    | 2    | 2     |                           |  |  |  |  |  |  |
| 12:15 PM                  | 0      | 0    | 216  | 7     | 0      | 3    | 160                       | 0     | 0      | 0    | 0    | 0     | 0      | 0         | 0    | 0     | 8      | 0    | 3    | 4     |                           |  |  |  |  |  |  |
| 12:30 PM                  | 0      | 0    | 205  | 7     | 0      | 4    | 145                       | 0     | 0      | 0    | 0    | 0     | 0      | 0         | 0    | 0     | 6      | 0    | 5    | 5     |                           |  |  |  |  |  |  |
| 12:45 PM                  | 0      | 0    | 196  | 8     | 0      | 5    | 133                       | 0     | 0      | 0    | 0    | 0     | 0      | 0         | 0    | 0     | 7      | 0    | 6    | 6     |                           |  |  |  |  |  |  |
| 1:00 PM                   | 0      | 0    | 218  | 7     | 0      | 6    | 167                       | 0     | 0      | 0    | 0    | 0     | 0      | 0         | 0    | 0     | 6      | 0    | 6    | 6     |                           |  |  |  |  |  |  |
| 1:15 AM                   | 0      | 0    | 206  | 8     | 0      | 6    | 148                       | 0     | 0      | 0    | 0    | 0     | 0      | 0         | 0    | 0     | 8      | 0    | 7    | 7     |                           |  |  |  |  |  |  |
| 1:30 AM                   | 0      | 0    | 218  | 6     | 0      | 5    | 158                       | 0     | 0      | 0    | 0    | 0     | 0      | 0         | 0    | 0     | 7      | 0    | 6    | 6     |                           |  |  |  |  |  |  |
| 1:45 AM                   | 0      | 0    | 231  | 5     | 0      | 4    | 150                       | 0     | 0      | 0    | 0    | 0     | 0      | 0         | 0    | 0     | 6      | 0    | 7    | 7     |                           |  |  |  |  |  |  |

| Needham Street Northbound |      |      |       | Needham Street Southbound |      |      |       | Eastbound |      |      |       | Jaconnet Street Westbound |      |      |       |
|---------------------------|------|------|-------|---------------------------|------|------|-------|-----------|------|------|-------|---------------------------|------|------|-------|
| U-Turn                    | Left | Thru | Right | U-Turn                    | Left | Thru | Right | U-Turn    | Left | Thru | Right | U-Turn                    | Left | Thru | Right |
| 1:00 PM                   | 0    | 0    | 873   | 26                        | 0    | 21   | 623   | 0         | 0    | 0    | 0     | 0                         | 27   | 0    | 26    |
| PHF                       | 0.95 |      |       |                           | 0.93 |      |       |           | 0.00 |      |       |                           | 0.88 |      |       |
| PH %                      | 0.0% | 0.0% | 0.1%  | 0.0%                      | 0.0% | 0.0% | 0.2%  | 0.0%      | 0.0% | 0.0% | 0.0%  | 0.0%                      | 0.0% | 0.0% | 0.0%  |



Client: Matt Duranleau  
Project #: 12239.00\_127\_018\_VHB  
BTD #: Location 11  
Location: Newton, MA  
Street 1: Needham Street  
Street 2: Jaconnet Street  
Count Date: 10/28/2017  
Day of Week: Saturday  
Weather: Sun w/ Clouds, 65°F



TRUCKS

| Start Time           | Needham Street Northbound |      |      |       | Needham Street Southbound |      |      |       | Eastbound |      |      |       | Jaconnet Street Westbound |      |      |       |
|----------------------|---------------------------|------|------|-------|---------------------------|------|------|-------|-----------|------|------|-------|---------------------------|------|------|-------|
|                      | U-Turn                    | Left | Thru | Right | U-Turn                    | Left | Thru | Right | U-Turn    | Left | Thru | Right | U-Turn                    | Left | Thru | Right |
| 11:00 AM             | 0                         | 0    | 2    | 0     | 0                         | 0    | 0    | 0     | 0         | 0    | 0    | 0     | 0                         | 0    | 0    | 0     |
| 11:15 AM             | 0                         | 0    | 1    | 0     | 0                         | 0    | 2    | 0     | 0         | 0    | 0    | 0     | 0                         | 0    | 0    | 0     |
| 11:30 AM             | 0                         | 0    | 2    | 0     | 0                         | 0    | 0    | 0     | 0         | 0    | 0    | 0     | 0                         | 0    | 0    | 0     |
| 11:45 AM             | 0                         | 0    | 0    | 0     | 0                         | 0    | 2    | 0     | 0         | 0    | 0    | 0     | 0                         | 0    | 0    | 0     |
| 12:00 PM             | 0                         | 0    | 0    | 0     | 0                         | 0    | 1    | 0     | 0         | 0    | 0    | 0     | 0                         | 0    | 0    | 0     |
| 12:15 PM             | 0                         | 0    | 1    | 0     | 0                         | 0    | 0    | 0     | 0         | 0    | 0    | 0     | 0                         | 0    | 0    | 0     |
| 12:30 PM             | 0                         | 0    | 0    | 0     | 0                         | 0    | 2    | 0     | 0         | 0    | 0    | 0     | 0                         | 0    | 0    | 0     |
| 12:45 PM             | 0                         | 0    | 1    | 0     | 0                         | 0    | 0    | 0     | 0         | 0    | 0    | 0     | 0                         | 0    | 0    | 0     |
| 1:00 PM              | 0                         | 0    | 0    | 0     | 0                         | 0    | 1    | 0     | 0         | 0    | 0    | 0     | 0                         | 0    | 0    | 0     |
| 1:15 AM              | 0                         | 0    | 0    | 0     | 0                         | 0    | 0    | 0     | 0         | 0    | 0    | 0     | 0                         | 0    | 0    | 0     |
| 1:30 AM              | 0                         | 0    | 1    | 0     | 0                         | 0    | 0    | 0     | 0         | 0    | 0    | 0     | 0                         | 0    | 0    | 0     |
| 1:45 AM              | 0                         | 0    | 0    | 0     | 0                         | 0    | 0    | 0     | 0         | 0    | 0    | 0     | 0                         | 0    | 0    | 0     |
| SAT PEAK HOUR        |                           |      |      |       |                           |      |      |       |           |      |      |       |                           |      |      |       |
| 11:00 AM to 12:00 PM |                           |      |      |       |                           |      |      |       |           |      |      |       |                           |      |      |       |
| PHF                  |                           |      |      |       |                           |      |      |       |           |      |      |       |                           |      |      |       |
| 0.63                 |                           |      |      | 0.50  |                           |      |      | 0.00  |           |      |      | 0.00  |                           |      |      | 0     |

Client: Matt Duranleau  
Project #: 12239.00\_127\_018\_VHB  
BTD #: Location 11  
Location: Newton, MA  
Street 1: Needham Street  
Street 2: Jaconnet Street  
Count Date: 10/28/2017  
Day of Week: Saturday  
Weather: Sun w/ Clouds, 65°F



PEDESTRIANS & BICYCLES

| Start Time                                      | Needham Street Northbound |      |       |     | Needham Street Southbound |      |       |     | Eastbound |      |       |     | Jaconnet Street Westbound |      |       |     |
|-------------------------------------------------|---------------------------|------|-------|-----|---------------------------|------|-------|-----|-----------|------|-------|-----|---------------------------|------|-------|-----|
|                                                 | Left                      | Thru | Right | PED | Left                      | Thru | Right | PED | Left      | Thru | Right | PED | Left                      | Thru | Right | PED |
| 11:00 AM                                        | 0                         | 1    | 0     | 0   | 0                         | 0    | 0     | 0   | 0         | 0    | 0     | 0   | 0                         | 0    | 0     | 21  |
| 11:15 AM                                        | 0                         | 0    | 0     | 0   | 0                         | 0    | 0     | 0   | 0         | 0    | 0     | 0   | 0                         | 0    | 0     | 14  |
| 11:30 AM                                        | 0                         | 0    | 0     | 0   | 0                         | 1    | 0     | 0   | 0         | 0    | 0     | 0   | 0                         | 0    | 0     | 12  |
| 11:45 AM                                        | 0                         | 0    | 0     | 0   | 0                         | 0    | 0     | 0   | 0         | 0    | 0     | 0   | 0                         | 0    | 0     | 16  |
| 12:00 PM                                        | 0                         | 1    | 0     | 0   | 0                         | 0    | 0     | 0   | 0         | 0    | 0     | 0   | 0                         | 0    | 0     | 11  |
| 12:15 PM                                        | 0                         | 1    | 0     | 0   | 0                         | 0    | 0     | 0   | 0         | 0    | 0     | 0   | 0                         | 0    | 0     | 9   |
| 12:30 PM                                        | 0                         | 0    | 0     | 0   | 0                         | 0    | 0     | 0   | 0         | 0    | 0     | 0   | 0                         | 0    | 0     | 12  |
| 12:45 PM                                        | 0                         | 0    | 0     | 0   | 0                         | 0    | 0     | 0   | 0         | 0    | 0     | 0   | 0                         | 0    | 0     | 9   |
| 1:00 PM                                         | 0                         | 1    | 0     | 0   | 0                         | 0    | 0     | 0   | 0         | 0    | 0     | 0   | 0                         | 0    | 0     | 8   |
| 1:15 AM                                         | 0                         | 0    | 0     | 0   | 0                         | 1    | 0     | 0   | 0         | 0    | 0     | 0   | 0                         | 0    | 0     | 11  |
| 1:30 AM                                         | 0                         | 1    | 0     | 0   | 0                         | 0    | 0     | 0   | 0         | 0    | 0     | 0   | 0                         | 0    | 0     | 7   |
| 1:45 AM                                         | 0                         | 0    | 0     | 0   | 0                         | 0    | 0     | 0   | 0         | 0    | 0     | 0   | 0                         | 0    | 0     | 9   |
| SAT PEAK HOUR                                   |                           |      |       |     |                           |      |       |     |           |      |       |     |                           |      |       |     |
| 1:00 PM to 2:00 PM                              |                           |      |       |     |                           |      |       |     |           |      |       |     |                           |      |       |     |
| 0                                               |                           |      |       | 2   | 0                         | 0    | 0     | 0   | 0         | 1    | 0     | 0   | 0                         | 0    | 0     | 35  |
| Peak hours corresponds to vehicular peak hours. |                           |      |       |     |                           |      |       |     |           |      |       |     |                           |      |       |     |

Client: Matt Duranleau  
Project #: 12239.00\_127\_018\_VHB  
BTD #: Location 12  
Location: Newton, MA  
Street 1: Needham Street  
Street 2: Rockland Street  
Count Date: 10/28/2017  
Day of Week: Saturday  
Weather: Sun w/ Clouds, 65°F



**TOTAL (CARS & TRUCKS)**

| Start Time | Needham Street Northbound |      |      |       | Needham Street Southbound |      |      |       | Eastbound |      |      |       | Rockland Street Westbound |      |      |       |
|------------|---------------------------|------|------|-------|---------------------------|------|------|-------|-----------|------|------|-------|---------------------------|------|------|-------|
|            | U-Turn                    | Left | Thru | Right | U-Turn                    | Left | Thru | Right | U-Turn    | Left | Thru | Right | U-Turn                    | Left | Thru | Right |
| 11:00 AM   | 0                         | 0    | 244  | 3     | 0                         | 5    | 164  | 0     | 0         | 0    | 0    | 0     | 0                         | 4    | 0    | 4     |
| 11:15 AM   | 0                         | 0    | 203  | 5     | 0                         | 6    | 160  | 0     | 0         | 0    | 0    | 0     | 0                         | 5    | 0    | 6     |
| 11:30 AM   | 0                         | 0    | 222  | 4     | 0                         | 6    | 162  | 0     | 0         | 0    | 0    | 0     | 0                         | 4    | 0    | 5     |
| 11:45 AM   | 0                         | 0    | 192  | 5     | 0                         | 7    | 158  | 0     | 0         | 0    | 0    | 0     | 0                         | 4    | 0    | 4     |
| 12:00 PM   | 0                         | 0    | 210  | 6     | 0                         | 6    | 142  | 0     | 0         | 0    | 0    | 0     | 0                         | 3    | 0    | 6     |
| 12:15 PM   | 0                         | 0    | 212  | 8     | 0                         | 7    | 159  | 0     | 0         | 0    | 0    | 0     | 0                         | 4    | 0    | 5     |
| 12:30 PM   | 0                         | 0    | 203  | 7     | 0                         | 5    | 146  | 0     | 0         | 0    | 0    | 0     | 0                         | 3    | 0    | 4     |
| 12:45 PM   | 0                         | 0    | 194  | 8     | 0                         | 6    | 131  | 0     | 0         | 0    | 0    | 0     | 0                         | 4    | 0    | 5     |
| 1:00 PM    | 0                         | 0    | 215  | 9     | 0                         | 4    | 174  | 0     | 0         | 0    | 0    | 0     | 0                         | 2    | 0    | 3     |
| 1:15 AM    | 0                         | 0    | 204  | 9     | 0                         | 5    | 151  | 0     | 0         | 0    | 0    | 0     | 0                         | 3    | 0    | 5     |
| 1:30 AM    | 0                         | 0    | 216  | 8     | 0                         | 4    | 159  | 0     | 0         | 0    | 0    | 0     | 0                         | 3    | 0    | 4     |
| 1:45 AM    | 0                         | 0    | 231  | 7     | 0                         | 4    | 150  | 0     | 0         | 0    | 0    | 0     | 0                         | 4    | 0    | 3     |

| SAT PEAK HOUR        |  | Needham Street Northbound |      |      |       | Needham Street Southbound |      |      |       | Eastbound |      |      |       | Rockland Street Westbound |      |      |       |
|----------------------|--|---------------------------|------|------|-------|---------------------------|------|------|-------|-----------|------|------|-------|---------------------------|------|------|-------|
| 11:00 AM to 12:00 PM |  | U-Turn                    | Left | Thru | Right | U-Turn                    | Left | Thru | Right | U-Turn    | Left | Thru | Right | U-Turn                    | Left | Thru | Right |
| PHF                  |  | 0                         | 0    | 861  | 17    | 0                         | 24   | 644  | 0     | 0         | 0    | 0    | 0     | 0                         | 17   | 0    | 19    |
| HV %                 |  | 0.0%                      | 0.0% | 0.5% | 0.0%  | 0.0%                      | 0.0% | 0.9% | 0.6%  | 0.0%      | 0.0% | 0.0% | 0.0%  | 0.0%                      | 0.0% | 0.0% | 0.0%  |

Client: Matt Duranleau  
Project #: 12239.00\_127\_018\_VHB  
BTD #: Location 12  
Location: Newton, MA  
Street 1: Needham Street  
Street 2: Rockland Street  
Count Date: 10/28/2017  
Day of Week: Saturday  
Weather: Sun w/ Clouds, 65°F



**TRUCKS**

| Start Time | Needham Street Northbound |      |      |       | Needham Street Southbound |      |      |       | Eastbound |      |      |       | Rockland Street Westbound |      |      |       |
|------------|---------------------------|------|------|-------|---------------------------|------|------|-------|-----------|------|------|-------|---------------------------|------|------|-------|
|            | U-Turn                    | Left | Thru | Right | U-Turn                    | Left | Thru | Right | U-Turn    | Left | Thru | Right | U-Turn                    | Left | Thru | Right |
| 11:00 AM   | 0                         | 0    | 1    | 0     | 0                         | 0    | 0    | 0     | 0         | 0    | 0    | 0     | 0                         | 0    | 0    | 0     |
| 11:15 AM   | 0                         | 0    | 2    | 0     | 0                         | 0    | 1    | 0     | 0         | 0    | 0    | 0     | 0                         | 0    | 0    | 0     |
| 11:30 AM   | 0                         | 0    | 1    | 0     | 0                         | 0    | 1    | 0     | 0         | 0    | 0    | 0     | 0                         | 0    | 0    | 0     |
| 11:45 AM   | 0                         | 0    | 0    | 0     | 0                         | 2    | 0    | 0     | 0         | 0    | 0    | 0     | 0                         | 0    | 0    | 0     |
| 12:00 PM   | 0                         | 0    | 1    | 0     | 0                         | 0    | 1    | 0     | 0         | 0    | 0    | 0     | 0                         | 0    | 0    | 0     |
| 12:15 PM   | 0                         | 0    | 1    | 0     | 0                         | 0    | 0    | 0     | 0         | 0    | 0    | 0     | 0                         | 0    | 0    | 0     |
| 12:30 PM   | 0                         | 0    | 0    | 0     | 0                         | 2    | 0    | 0     | 0         | 0    | 0    | 0     | 0                         | 0    | 0    | 0     |
| 12:45 PM   | 0                         | 0    | 1    | 0     | 0                         | 0    | 0    | 0     | 0         | 0    | 0    | 0     | 0                         | 0    | 0    | 0     |
| 1:00 PM    | 0                         | 0    | 0    | 0     | 0                         | 0    | 1    | 0     | 0         | 0    | 0    | 0     | 0                         | 0    | 0    | 0     |
| 1:15 AM    | 0                         | 0    | 0    | 0     | 0                         | 0    | 0    | 0     | 0         | 0    | 0    | 0     | 0                         | 0    | 0    | 0     |
| 1:30 AM    | 0                         | 0    | 1    | 0     | 0                         | 0    | 0    | 0     | 0         | 0    | 0    | 0     | 0                         | 0    | 0    | 0     |
| 1:45 AM    | 0                         | 0    | 0    | 0     | 0                         | 1    | 0    | 0     | 0         | 0    | 0    | 0     | 0                         | 0    | 0    | 0     |

| SAT PEAK HOUR        |  | Needham Street Northbound |      |      |       | Needham Street Southbound |      |      |       | Eastbound |      |      |       | Rockland Street Westbound |      |      |       |
|----------------------|--|---------------------------|------|------|-------|---------------------------|------|------|-------|-----------|------|------|-------|---------------------------|------|------|-------|
| 11:15 AM to 12:15 PM |  | U-Turn                    | Left | Thru | Right | U-Turn                    | Left | Thru | Right | U-Turn    | Left | Thru | Right | U-Turn                    | Left | Thru | Right |
| PHF                  |  | 0                         | 0    | 4    | 0     | 0                         | 0    | 5    | 0     | 0         | 0    | 0    | 0     | 0                         | 0    | 0    | 0     |
|                      |  | 0.50                      |      |      |       | 0.63                      |      |      |       | 0.00      |      |      |       | 0.00                      |      |      |       |

Client: Matt Duranleau  
Project #: 12239.00\_127\_018\_VHB  
BTD #: Location 12  
Location: Newton, MA  
Street 1: Needham Street  
Street 2: Rockland Street  
Count Date: 10/26/2017  
Day of Week: Saturday  
Weather: Sun w/ Clouds, 65°F



PEDESTRIANS & BICYCLES

| Needham Street Northbound |      |      |       |     | Needham Street Southbound |      |       |     |      | Eastbound |       |     |      |      | Rockland Street Westbound |     |      |      |       |
|---------------------------|------|------|-------|-----|---------------------------|------|-------|-----|------|-----------|-------|-----|------|------|---------------------------|-----|------|------|-------|
| Start Time                | Left | Thru | Right | PED | Left                      | Thru | Right | PED | Left | Thru      | Right | PED | Left | Thru | Right                     | PED | Left | Thru | Right |
| 11:00 AM                  | 0    | 1    | 0     | 0   | 0                         | 0    | 0     | 1   | 0    | 0         | 0     | 0   | 0    | 0    | 0                         | 0   | 0    | 0    | 7     |
| 11:15 AM                  | 0    | 0    | 0     | 0   | 0                         | 0    | 0     | 0   | 0    | 0         | 0     | 0   | 0    | 0    | 0                         | 0   | 0    | 0    | 5     |
| 11:30 AM                  | 0    | 0    | 0     | 0   | 0                         | 1    | 0     | 0   | 0    | 0         | 0     | 0   | 0    | 0    | 0                         | 0   | 0    | 0    | 2     |
| 11:45 AM                  | 0    | 0    | 0     | 0   | 0                         | 0    | 0     | 0   | 0    | 0         | 0     | 0   | 0    | 0    | 0                         | 0   | 0    | 0    | 3     |
| 12:00 PM                  | 0    | 1    | 0     | 1   | 0                         | 1    | 0     | 0   | 0    | 0         | 0     | 0   | 0    | 0    | 0                         | 0   | 0    | 0    | 4     |
| 12:15 PM                  | 0    | 1    | 0     | 0   | 0                         | 0    | 0     | 0   | 0    | 0         | 0     | 0   | 0    | 0    | 0                         | 0   | 0    | 0    | 4     |
| 12:30 PM                  | 0    | 0    | 0     | 0   | 0                         | 0    | 0     | 0   | 0    | 0         | 0     | 0   | 0    | 0    | 0                         | 0   | 0    | 0    | 3     |
| 12:45 PM                  | 0    | 1    | 0     | 0   | 0                         | 0    | 0     | 1   | 0    | 0         | 0     | 0   | 0    | 0    | 0                         | 0   | 0    | 0    | 5     |
| 1:00 PM                   | 0    | 0    | 0     | 0   | 0                         | 1    | 0     | 0   | 0    | 0         | 0     | 0   | 0    | 0    | 0                         | 0   | 0    | 0    | 6     |
| 1:15 AM                   | 0    | 0    | 0     | 0   | 0                         | 0    | 0     | 0   | 0    | 0         | 0     | 0   | 0    | 0    | 0                         | 0   | 0    | 0    | 4     |
| 1:30 AM                   | 0    | 1    | 0     | 0   | 0                         | 0    | 0     | 0   | 0    | 0         | 0     | 0   | 0    | 0    | 0                         | 0   | 0    | 0    | 2     |
| 1:45 AM                   | 0    | 0    | 0     | 0   | 0                         | 0    | 0     | 0   | 0    | 0         | 0     | 0   | 0    | 0    | 0                         | 0   | 0    | 0    | 3     |

| Needham Street Northbound |      |      |       |     | Needham Street Southbound |      |       |     |      | Eastbound |       |     |      |      | Rockland Street Westbound |     |      |      |       |
|---------------------------|------|------|-------|-----|---------------------------|------|-------|-----|------|-----------|-------|-----|------|------|---------------------------|-----|------|------|-------|
| 11:00 AM                  | Left | Thru | Right | PED | Left                      | Thru | Right | PED | Left | Thru      | Right | PED | Left | Thru | Right                     | PED | Left | Thru | Right |
| 12:00 PM                  | 0    | 1    | 0     | 0   | 0                         | 1    | 0     | 1   | 0    | 0         | 0     | 0   | 0    | 0    | 0                         | 0   | 0    | 0    | 17    |

Peak hours corresponds to vehicular peak hours.

Client: Matt Duranleau  
Project #: 12239.00\_127\_018\_VHB  
BTD #: Location 13  
Location: Newton, MA  
Street 1: Centre Street  
Street 2: Walnut Street  
Count Date: 10/26/2017  
Day of Week: Saturday  
Weather: Sun w/ Clouds, 65°F



TOTAL (CARS & TRUCKS)

| Centre Street Northeastbound |        |      |      |       | Centre Street Southwestbound |      |      |       |        | Walnut Street Southeastbound |      |       |        |      | Walnut Street Northwestbound |       |        |      |      |
|------------------------------|--------|------|------|-------|------------------------------|------|------|-------|--------|------------------------------|------|-------|--------|------|------------------------------|-------|--------|------|------|
| Start Time                   | U-Turn | Left | Thru | Right | U-Turn                       | Left | Thru | Right | U-Turn | Left                         | Thru | Right | U-Turn | Left | Thru                         | Right | U-Turn | Left | Thru |
| 11:00 AM                     | 0      | 89   | 108  | 3     | 0                            | 0    | 77   | 12    | 0      | 5                            | 1    | 75    | 0      | 8    | 28                           | 1     | 0      | 0    | 0    |
| 11:15 AM                     | 0      | 95   | 73   | 3     | 0                            | 0    | 63   | 14    | 0      | 6                            | 2    | 79    | 0      | 10   | 26                           | 0     | 0      | 0    | 0    |
| 11:30 AM                     | 0      | 98   | 80   | 2     | 0                            | 1    | 74   | 15    | 0      | 8                            | 2    | 78    | 0      | 9    | 27                           | 0     | 0      | 0    | 0    |
| 11:45 AM                     | 0      | 96   | 37   | 3     | 0                            | 1    | 68   | 16    | 0      | 7                            | 1    | 77    | 0      | 10   | 26                           | 1     | 0      | 0    | 0    |
| 12:00 PM                     | 0      | 94   | 52   | 3     | 0                            | 2    | 58   | 17    | 0      | 8                            | 2    | 75    | 0      | 11   | 24                           | 0     | 0      | 0    | 0    |
| 12:15 PM                     | 0      | 97   | 58   | 4     | 0                            | 2    | 88   | 15    | 0      | 6                            | 1    | 76    | 0      | 9    | 23                           | 1     | 0      | 0    | 0    |
| 12:30 PM                     | 0      | 98   | 60   | 3     | 0                            | 1    | 82   | 16    | 0      | 7                            | 2    | 78    | 0      | 10   | 22                           | 1     | 0      | 0    | 0    |
| 12:45 PM                     | 0      | 97   | 57   | 3     | 0                            | 2    | 67   | 15    | 0      | 8                            | 2    | 79    | 0      | 12   | 24                           | 0     | 0      | 0    | 0    |
| 1:00 PM                      | 0      | 93   | 99   | 2     | 0                            | 2    | 105  | 17    | 0      | 10                           | 3    | 81    | 0      | 11   | 21                           | 1     | 0      | 0    | 0    |
| 1:15 AM                      | 0      | 95   | 78   | 3     | 0                            | 1    | 80   | 19    | 0      | 12                           | 3    | 82    | 0      | 10   | 20                           | 1     | 0      | 0    | 0    |
| 1:30 AM                      | 0      | 94   | 90   | 2     | 0                            | 2    | 86   | 18    | 0      | 10                           | 2    | 81    | 0      | 9    | 19                           | 0     | 0      | 0    | 0    |
| 1:45 AM                      | 0      | 96   | 104  | 2     | 0                            | 1    | 78   | 17    | 0      | 11                           | 2    | 80    | 0      | 9    | 20                           | 0     | 0      | 0    | 0    |

| SAT PEAK HOUR<br>1:00 PM<br>to<br>2:00 PM<br><br>PHF<br>HV % |  | Centre Street<br>Northeastbound |      |      |       | Centre Street<br>Southwestbound |      |      |       | Walnut Street<br>Southeastbound |      |      |       | Walnut Street<br>Northwestbound |      |      |       |
|--------------------------------------------------------------|--|---------------------------------|------|------|-------|---------------------------------|------|------|-------|---------------------------------|------|------|-------|---------------------------------|------|------|-------|
|                                                              |  | U-Turn                          | Left | Thru | Right | U-Turn                          | Left | Thru | Right | U-Turn                          | Left | Thru | Right | U-Turn                          | Left | Thru | Right |
|                                                              |  | 0                               | 378  | 371  | 9     | 0                               | 6    | 347  | 71    | 0                               | 43   | 10   | 324   | 0                               | 39   | 80   | 2     |
|                                                              |  | 0.94                            |      |      |       | 0.85                            |      |      |       | 0.97                            |      |      |       | 0.92                            |      |      |       |
|                                                              |  | 0.0%                            | 0.8% | 0.3% | 0.0%  | 0.0%                            | 0.0% | 0.0% | 0.0%  | 0.0%                            | 0.0% | 0.0% | 0.6%  | 0.0%                            | 0.0% | 0.0% | 0.0%  |

Client: Matt Duranleau  
Project #: 12239.00\_127\_018\_VHB  
BTD #: Location 13  
Location: Newton, MA  
Street 1: Centre Street  
Street 2: Walnut Street  
Count Date: 10/28/2017  
Day of Week: Saturday  
Weather: Sun w/ Clouds, 65°F



**TRUCKS**

| Start Time | Centre Street Northeastbound |      |      |       | Centre Street Southwestbound |      |      |       | Walnut Street Southeastbound |      |      |       | Walnut Street Northwestbound |      |      |       |
|------------|------------------------------|------|------|-------|------------------------------|------|------|-------|------------------------------|------|------|-------|------------------------------|------|------|-------|
|            | U-Turn                       | Left | Thru | Right | U-Turn                       | Left | Thru | Right | U-Turn                       | Left | Thru | Right | U-Turn                       | Left | Thru | Right |
| 11:00 AM   | 0                            | 1    | 0    | 0     | 0                            | 0    | 0    | 0     | 0                            | 0    | 0    | 0     | 0                            | 0    | 0    | 0     |
| 11:15 AM   | 0                            | 0    | 1    | 0     | 0                            | 0    | 0    | 0     | 0                            | 0    | 0    | 1     | 0                            | 0    | 0    | 0     |
| 11:30 AM   | 0                            | 2    | 0    | 0     | 0                            | 0    | 1    | 0     | 0                            | 0    | 0    | 1     | 0                            | 0    | 0    | 0     |
| 11:45 AM   | 0                            | 1    | 1    | 0     | 0                            | 0    | 0    | 0     | 0                            | 0    | 0    | 0     | 0                            | 1    | 0    | 0     |
| 12:00 PM   | 0                            | 1    | 0    | 0     | 0                            | 0    | 0    | 0     | 0                            | 0    | 0    | 2     | 0                            | 0    | 0    | 0     |
| 12:15 PM   | 0                            | 0    | 0    | 0     | 0                            | 0    | 1    | 0     | 0                            | 0    | 0    | 0     | 0                            | 0    | 0    | 0     |
| 12:30 PM   | 0                            | 1    | 0    | 0     | 0                            | 0    | 0    | 0     | 0                            | 0    | 0    | 1     | 0                            | 0    | 0    | 0     |
| 12:45 PM   | 0                            | 0    | 0    | 0     | 0                            | 0    | 0    | 0     | 0                            | 0    | 0    | 0     | 0                            | 0    | 0    | 0     |
| 1:00 PM    | 0                            | 2    | 0    | 0     | 0                            | 0    | 0    | 0     | 0                            | 0    | 0    | 1     | 0                            | 0    | 0    | 0     |
| 1:15 AM    | 0                            | 0    | 1    | 0     | 0                            | 0    | 0    | 0     | 0                            | 0    | 0    | 0     | 0                            | 0    | 0    | 0     |
| 1:30 AM    | 0                            | 1    | 0    | 0     | 0                            | 0    | 0    | 0     | 0                            | 0    | 0    | 1     | 0                            | 0    | 0    | 0     |
| 1:45 AM    | 0                            | 0    | 0    | 0     | 0                            | 0    | 0    | 0     | 0                            | 0    | 0    | 0     | 0                            | 0    | 0    | 0     |

| SAT PEAK HOUR<br>11:15 AM<br>to<br>12:15 PM | Centre Street Northeastbound |      |      |       | Centre Street Southwestbound |      |      |       | Walnut Street Southeastbound |      |      |       | Walnut Street Northwestbound |      |      |       |
|---------------------------------------------|------------------------------|------|------|-------|------------------------------|------|------|-------|------------------------------|------|------|-------|------------------------------|------|------|-------|
|                                             | U-Turn                       | Left | Thru | Right | U-Turn                       | Left | Thru | Right | U-Turn                       | Left | Thru | Right | U-Turn                       | Left | Thru | Right |
| PHF                                         | 0                            | 4    | 2    | 0     | 0                            | 0    | 1    | 0     | 0                            | 0    | 0    | 4     | 0                            | 1    | 0    | 0     |
|                                             | 0.75                         |      |      |       | 0.25                         |      |      |       | 0.50                         |      |      |       | 0.25                         |      |      |       |

Client: Matt Duranleau  
Project #: 12239.00\_127\_018\_VHB  
BTD #: Location 13  
Location: Newton, MA  
Street 1: Centre Street  
Street 2: Walnut Street  
Count Date: 10/28/2017  
Day of Week: Saturday  
Weather: Sun w/ Clouds, 65°F



**PEDESTRIANS & BICYCLES**

| Start Time | Centre Street Northeastbound |      |       |     | Centre Street Southwestbound |      |       |     | Walnut Street Southeastbound |      |       |     | Walnut Street Northwestbound |      |       |     |
|------------|------------------------------|------|-------|-----|------------------------------|------|-------|-----|------------------------------|------|-------|-----|------------------------------|------|-------|-----|
|            | Left                         | Thru | Right | PED | Left                         | Thru | Right | PED | Left                         | Thru | Right | PED | Left                         | Thru | Right | PED |
| 11:00 AM   | 0                            | 0    | 0     | 0   | 0                            | 1    | 0     | 2   | 0                            | 0    | 0     | 1   | 0                            | 0    | 0     | 0   |
| 11:15 AM   | 0                            | 0    | 0     | 0   | 0                            | 0    | 1     | 0   | 0                            | 0    | 0     | 2   | 0                            | 0    | 0     | 0   |
| 11:30 AM   | 0                            | 0    | 0     | 2   | 0                            | 0    | 0     | 1   | 0                            | 0    | 0     | 0   | 0                            | 1    | 0     | 2   |
| 11:45 AM   | 0                            | 1    | 0     | 0   | 0                            | 0    | 0     | 1   | 0                            | 0    | 0     | 1   | 0                            | 0    | 0     | 1   |
| 12:00 PM   | 0                            | 0    | 0     | 0   | 0                            | 0    | 1     | 0   | 1                            | 0    | 0     | 0   | 0                            | 0    | 0     | 0   |
| 12:15 PM   | 0                            | 0    | 0     | 1   | 0                            | 0    | 0     | 1   | 0                            | 0    | 0     | 2   | 0                            | 0    | 0     | 0   |
| 12:30 PM   | 0                            | 0    | 0     | 0   | 0                            | 1    | 0     | 2   | 0                            | 0    | 0     | 1   | 0                            | 0    | 0     | 1   |
| 12:45 PM   | 0                            | 0    | 0     | 3   | 0                            | 1    | 1     | 1   | 0                            | 0    | 0     | 0   | 0                            | 0    | 0     | 2   |
| 1:00 PM    | 0                            | 0    | 0     | 0   | 0                            | 0    | 0     | 0   | 1                            | 0    | 0     | 1   | 0                            | 0    | 0     | 0   |
| 1:15 AM    | 1                            | 0    | 0     | 1   | 0                            | 0    | 0     | 0   | 0                            | 0    | 0     | 2   | 0                            | 0    | 0     | 1   |
| 1:30 AM    | 0                            | 1    | 0     | 0   | 0                            | 0    | 0     | 1   | 0                            | 0    | 0     | 0   | 0                            | 0    | 0     | 0   |
| 1:45 AM    | 0                            | 3    | 0     | 0   | 0                            | 0    | 0     | 0   | 0                            | 0    | 0     | 1   | 0                            | 0    | 0     | 0   |

| SAT PEAK HOUR <sup>1</sup><br>1:00 PM<br>to<br>2:00 PM | Centre Street Northeastbound |      |       |     | Centre Street Southwestbound |      |       |     | Walnut Street Southeastbound |      |       |     | Walnut Street Northwestbound |      |       |     |
|--------------------------------------------------------|------------------------------|------|-------|-----|------------------------------|------|-------|-----|------------------------------|------|-------|-----|------------------------------|------|-------|-----|
|                                                        | Left                         | Thru | Right | PED | Left                         | Thru | Right | PED | Left                         | Thru | Right | PED | Left                         | Thru | Right | PED |
|                                                        | 1                            | 4    | 0     | 1   | 0                            | 0    | 0     | 1   | 1                            | 0    | 0     | 4   | 0                            | 0    | 0     | 1   |

<sup>1</sup> Peak hours corresponds to vehicular peak hours.

Client: Matt Duranleau  
Project #: 12239.00\_127\_018\_VHB  
BTD #: Location 14  
Location: Newton, MA  
Street 1: Nahanton Street  
Street 2: Wells Avenue / Winchester Street  
Count Date: 10/28/2017  
Day of Week: Saturday  
Weather: Sun w/ Clouds, 65°F



**TOTAL (CARS & TRUCKS)**

| Start Time | Wells Avenue Northbound |      |      | Winchester Street Southbound |        |      | Nahanton Street Eastbound |       |        | Nahanton Street Westbound |      |       |
|------------|-------------------------|------|------|------------------------------|--------|------|---------------------------|-------|--------|---------------------------|------|-------|
|            | U-Turn                  | Left | Thru | Right                        | U-Turn | Left | Thru                      | Right | U-Turn | Left                      | Thru | Right |
| 11:00 AM   | 0                       | 51   | 1    | 22                           | 0      | 19   | 0                         | 12    | 0      | 6                         | 106  | 29    |
| 11:15 AM   | 0                       | 45   | 2    | 21                           | 0      | 22   | 1                         | 14    | 0      | 7                         | 110  | 32    |
| 11:30 AM   | 0                       | 38   | 2    | 20                           | 0      | 20   | 1                         | 13    | 0      | 8                         | 118  | 30    |
| 11:45 AM   | 0                       | 36   | 1    | 19                           | 0      | 17   | 0                         | 11    | 0      | 6                         | 121  | 27    |
| 12:00 PM   | 0                       | 33   | 2    | 18                           | 0      | 15   | 1                         | 9     | 0      | 5                         | 128  | 24    |
| 12:15 PM   | 0                       | 40   | 1    | 24                           | 0      | 12   | 1                         | 7     | 0      | 7                         | 129  | 20    |
| 12:30 PM   | 0                       | 45   | 1    | 29                           | 0      | 11   | 0                         | 9     | 0      | 6                         | 130  | 27    |
| 12:45 PM   | 0                       | 53   | 2    | 35                           | 0      | 10   | 1                         | 8     | 0      | 5                         | 125  | 33    |
| 1:00 PM    | 0                       | 59   | 1    | 39                           | 0      | 9    | 0                         | 10    | 0      | 4                         | 126  | 42    |
| 1:15 AM    | 0                       | 57   | 2    | 37                           | 0      | 7    | 0                         | 9     | 0      | 2                         | 123  | 49    |
| 1:30 AM    | 0                       | 52   | 2    | 34                           | 0      | 8    | 1                         | 8     | 0      | 3                         | 121  | 46    |
| 1:45 AM    | 0                       | 48   | 1    | 32                           | 0      | 8    | 0                         | 7     | 0      | 3                         | 118  | 41    |

| SAT PEAK HOUR<br>12:45 PM<br>to<br>1:45 AM | Wells Avenue Northbound |      |      | Winchester Street Southbound |        |      | Nahanton Street Eastbound |       |        | Nahanton Street Westbound |      |       |
|--------------------------------------------|-------------------------|------|------|------------------------------|--------|------|---------------------------|-------|--------|---------------------------|------|-------|
|                                            | U-Turn                  | Left | Thru | Right                        | U-Turn | Left | Thru                      | Right | U-Turn | Left                      | Thru | Right |
| PHF                                        | 0.94                    |      |      | 0.93                         |        |      | 0.98                      |       |        | 0.98                      |      |       |
| PH %                                       | 0.0%                    | 0.5% | 0.0% | 0.0%                         | 0.0%   | 0.0% | 0.0%                      | 0.0%  | 0.0%   | 0.0%                      | 0.2% | 0.0%  |

11/10/2017, 5:14 PM, 12239.00\_127\_018\_TMC\_Loc 14 (Saturday)

Client: Matt Duranleau  
Project #: 12239.00\_127\_018\_VHB  
BTD #: Location 14  
Location: Newton, MA  
Street 1: Nahanton Street  
Street 2: Wells Avenue / Winchester Street  
Count Date: 10/28/2017  
Day of Week: Saturday  
Weather: Sun w/ Clouds, 65°F



**TRUCKS**

| Start Time | Wells Avenue Northbound |      |      | Winchester Street Southbound |        |      | Nahanton Street Eastbound |       |        | Nahanton Street Westbound |      |       |
|------------|-------------------------|------|------|------------------------------|--------|------|---------------------------|-------|--------|---------------------------|------|-------|
|            | U-Turn                  | Left | Thru | Right                        | U-Turn | Left | Thru                      | Right | U-Turn | Left                      | Thru | Right |
| 11:00 AM   | 0                       | 0    | 0    | 0                            | 0      | 0    | 0                         | 0     | 0      | 0                         | 0    | 0     |
| 11:15 AM   | 0                       | 1    | 0    | 0                            | 0      | 0    | 0                         | 0     | 0      | 1                         | 0    | 0     |
| 11:30 AM   | 0                       | 0    | 0    | 0                            | 0      | 0    | 0                         | 0     | 0      | 0                         | 1    | 0     |
| 11:45 AM   | 0                       | 0    | 0    | 0                            | 0      | 0    | 0                         | 0     | 0      | 0                         | 0    | 1     |
| 12:00 PM   | 0                       | 0    | 0    | 0                            | 0      | 0    | 0                         | 0     | 0      | 0                         | 0    | 0     |
| 12:15 PM   | 0                       | 0    | 0    | 0                            | 0      | 0    | 0                         | 0     | 0      | 1                         | 0    | 0     |
| 12:30 PM   | 0                       | 0    | 0    | 0                            | 0      | 0    | 0                         | 0     | 0      | 0                         | 0    | 0     |
| 12:45 PM   | 0                       | 1    | 0    | 0                            | 0      | 0    | 0                         | 0     | 0      | 0                         | 0    | 1     |
| 1:00 PM    | 0                       | 0    | 0    | 0                            | 0      | 0    | 0                         | 0     | 0      | 0                         | 0    | 0     |
| 1:15 AM    | 0                       | 0    | 0    | 0                            | 0      | 0    | 0                         | 0     | 0      | 1                         | 0    | 0     |
| 1:30 AM    | 0                       | 0    | 0    | 0                            | 0      | 0    | 0                         | 0     | 0      | 0                         | 0    | 0     |
| 1:45 AM    | 0                       | 0    | 0    | 0                            | 0      | 0    | 0                         | 0     | 0      | 0                         | 0    | 0     |

| SAT PEAK HOUR<br>11:00 AM<br>to<br>12:00 PM | Wells Avenue Northbound |      |      | Winchester Street Southbound |        |      | Nahanton Street Eastbound |       |        | Nahanton Street Westbound |      |       |
|---------------------------------------------|-------------------------|------|------|------------------------------|--------|------|---------------------------|-------|--------|---------------------------|------|-------|
|                                             | U-Turn                  | Left | Thru | Right                        | U-Turn | Left | Thru                      | Right | U-Turn | Left                      | Thru | Right |
| PHF                                         | 0.25                    |      |      | 0.00                         |        |      | 0.25                      |       |        | 0.50                      |      |       |

11/10/2017, 5:14 PM, 12239.00\_127\_018\_TMC\_Loc 14 (Saturday)

Client: Matt Duranleau  
Project #: 12239.00\_127\_018\_VHB  
BTD #: Location 14  
Location: Newton, MA  
Street 1: Nahantown Street  
Street 2: Wells Avenue / Winchester Street  
Count Date: 10/26/2017  
Day of Week: Saturday  
Weather: Sun w/ Clouds, 65°F



PEDESTRIANS & BICYCLES

| Wells Avenue<br>Southbound |      |      |       |     | Winchester Street<br>Southbound |      |       |     |      | Nahantown Street<br>Eastbound |       |     |      |      | Nahantown Street<br>Westbound |     |  |  |  |
|----------------------------|------|------|-------|-----|---------------------------------|------|-------|-----|------|-------------------------------|-------|-----|------|------|-------------------------------|-----|--|--|--|
| Start Time                 | Left | Thru | Right | PED | Left                            | Thru | Right | PED | Left | Thru                          | Right | PED | Left | Thru | Right                         | PED |  |  |  |
| 11:00 AM                   | 0    | 0    | 0     | 1   | 0                               | 0    | 0     | 0   | 0    | 1                             | 0     | 0   | 0    | 2    | 0                             | 0   |  |  |  |
| 11:15 AM                   | 0    | 0    | 0     | 1   | 0                               | 0    | 0     | 0   | 0    | 5                             | 0     | 0   | 0    | 3    | 0                             | 0   |  |  |  |
| 11:30 AM                   | 0    | 0    | 0     | 1   | 0                               | 0    | 0     | 0   | 0    | 3                             | 0     | 0   | 0    | 0    | 0                             | 0   |  |  |  |
| 11:45 AM                   | 0    | 0    | 0     | 0   | 0                               | 0    | 0     | 0   | 0    | 0                             | 0     | 0   | 0    | 2    | 0                             | 0   |  |  |  |
| 12:00 PM                   | 2    | 0    | 0     | 0   | 0                               | 0    | 0     | 1   | 0    | 2                             | 0     | 0   | 0    | 2    | 0                             | 0   |  |  |  |
| 12:15 PM                   | 0    | 0    | 0     | 0   | 0                               | 0    | 0     | 0   | 0    | 5                             | 0     | 0   | 0    | 5    | 0                             | 0   |  |  |  |
| 12:30 PM                   | 0    | 0    | 0     | 0   | 0                               | 0    | 0     | 0   | 0    | 3                             | 0     | 0   | 0    | 0    | 0                             | 0   |  |  |  |
| 12:45 PM                   | 0    | 0    | 0     | 1   | 0                               | 0    | 0     | 0   | 0    | 2                             | 0     | 0   | 0    | 2    | 0                             | 0   |  |  |  |
| 1:00 PM                    | 0    | 0    | 0     | 0   | 0                               | 0    | 0     | 0   | 0    | 0                             | 0     | 0   | 0    | 5    | 0                             | 0   |  |  |  |
| 1:15 AM                    | 0    | 0    | 0     | 0   | 0                               | 0    | 0     | 1   | 0    | 1                             | 0     | 0   | 0    | 3    | 0                             | 0   |  |  |  |
| 1:30 AM                    | 0    | 0    | 0     | 0   | 0                               | 0    | 0     | 0   | 0    | 2                             | 0     | 0   | 0    | 1    | 0                             | 0   |  |  |  |
| 1:45 AM                    | 0    | 0    | 0     | 0   | 0                               | 0    | 0     | 0   | 0    | 0                             | 0     | 0   | 0    | 1    | 0                             | 0   |  |  |  |

| SAT PEAK HOUR <sup>1</sup><br>12:45 PM<br>to<br>1:45 AM | Wells Avenue<br>Northbound |      |       |     | Winchester Street<br>Southbound |      |       |     | Nahantown Street<br>Eastbound |      |       |     | Nahantown Street<br>Westbound |      |       |     |   |
|---------------------------------------------------------|----------------------------|------|-------|-----|---------------------------------|------|-------|-----|-------------------------------|------|-------|-----|-------------------------------|------|-------|-----|---|
|                                                         | Left                       | Thru | Right | PED | Left                            | Thru | Right | PED | Left                          | Thru | Right | PED | Left                          | Thru | Right | PED |   |
|                                                         | 0                          | 0    | 0     | 1   | 0                               | 0    | 0     | 1   | 0                             | 5    | 0     | 0   | 0                             | 0    | 11    | 0   | 0 |
|                                                         |                            |      |       |     |                                 |      |       |     |                               |      |       |     |                               |      |       |     |   |

\* Peak hours corresponds to vehicular peak hours.

Client: Matt Duranleau  
Project #: 12239.00\_127\_018\_VHB  
BTD #: Location 15  
Location: Newton, MA  
Street 1: Nahantown Street  
Street 2: Winchester Street  
Count Date: 10/26/2017  
Day of Week: Saturday  
Weather: Sun w/ Clouds, 65°F



TOTAL (CARS & TRUCKS)

| TABLE 10.10-1. TRAFFIC VOLUMES (Vehicles per Hour) |        |      |      |                              |        |      |      |                            |        |      |      |                            |        |      |      |       |
|----------------------------------------------------|--------|------|------|------------------------------|--------|------|------|----------------------------|--------|------|------|----------------------------|--------|------|------|-------|
| Northbound                                         |        |      |      | Winchester Street Southbound |        |      |      | Nahantown Street Eastbound |        |      |      | Nahantown Street Westbound |        |      |      |       |
| Start Time                                         | U-Turn | Left | Thru | Right                        | U-Turn | Left | Thru | Right                      | U-Turn | Left | Thru | Right                      | U-Turn | Left | Thru | Right |
| 11:00 AM                                           | 0      | 0    | 0    | 0                            | 0      | 16   | 0    | 39                         | 0      | 66   | 81   | 0                          | 0      | 0    | 96   | 12    |
| 11:15 AM                                           | 0      | 0    | 0    | 0                            | 0      | 15   | 0    | 41                         | 0      | 63   | 90   | 0                          | 0      | 0    | 106  | 10    |
| 11:30 AM                                           | 0      | 0    | 0    | 0                            | 0      | 14   | 0    | 42                         | 0      | 64   | 94   | 0                          | 0      | 0    | 115  | 11    |
| 11:45 AM                                           | 0      | 0    | 0    | 0                            | 0      | 13   | 0    | 45                         | 0      | 62   | 95   | 0                          | 0      | 0    | 122  | 12    |
| 12:00 PM                                           | 0      | 0    | 0    | 0                            | 0      | 12   | 0    | 44                         | 0      | 61   | 100  | 0                          | 0      | 0    | 127  | 10    |
| 12:15 PM                                           | 0      | 0    | 0    | 0                            | 0      | 14   | 0    | 55                         | 0      | 63   | 102  | 0                          | 0      | 0    | 126  | 11    |
| 12:30 PM                                           | 0      | 0    | 0    | 0                            | 0      | 15   | 0    | 64                         | 0      | 82   | 108  | 0                          | 0      | 0    | 117  | 12    |
| 12:45 PM                                           | 0      | 0    | 0    | 0                            | 0      | 17   | 0    | 74                         | 0      | 64   | 106  | 0                          | 0      | 0    | 112  | 13    |
| 1:00 PM                                            | 0      | 0    | 0    | 0                            | 0      | 19   | 0    | 81                         | 0      | 60   | 114  | 0                          | 0      | 0    | 102  | 11    |
| 1:15 AM                                            | 0      | 0    | 0    | 0                            | 0      | 18   | 0    | 80                         | 0      | 61   | 107  | 0                          | 0      | 0    | 103  | 10    |
| 1:30 AM                                            | 0      | 0    | 0    | 0                            | 0      | 16   | 0    | 78                         | 0      | 57   | 105  | 0                          | 0      | 0    | 96   | 9     |
| 1:45 AM                                            | 0      | 0    | 0    | 0                            | 0      | 17   | 0    | 73                         | 0      | 59   | 99   | 0                          | 0      | 0    | 91   | 10    |

| Northbound          |      |      |       | Winchester Street Southbound |      |      |       | Nahantown Street Eastbound |      |      |       | Nahantown Street Westbound |      |      |       |
|---------------------|------|------|-------|------------------------------|------|------|-------|----------------------------|------|------|-------|----------------------------|------|------|-------|
| U-Turn              | Left | Thru | Right | U-Turn                       | Left | Thru | Right | U-Turn                     | Left | Thru | Right | U-Turn                     | Left | Thru | Right |
| 12:30 PM to 1:30 AM | 0    | 0    | 0     | 0                            | 69   | 0    | 299   | 0                          | 247  | 435  | 0     | 0                          | 0    | 434  | 46    |
| PHF                 | 0.00 | 0.00 | 0.00  | 0.00                         | 0.92 | 0.00 | 0.00  | 0.98                       | 0.00 | 0.00 | 0.00  | 0.00                       | 0.00 | 0.00 | 0.00  |
| PH %                | 0.0% | 0.0% | 0.0%  | 0.0%                         | 1.4% | 0.0% | 0.0%  | 0.0%                       | 0.4% | 0.0% | 0.0%  | 0.0%                       | 0.0% | 0.2% | 2.2%  |

Client: Matt Duranleau  
Project #: 12239.00\_127\_018\_VHB  
BTD #: Location 15  
Location: Newton, MA  
Street 1: Nahanton Street  
Street 2: Winchester Street  
Count Date: 10/28/2017  
Day of Week: Saturday  
Weather: Sun w/ Clouds, 65°F



TRUCKS

| Start Time | Northbound |      |      |       | Winchester Street Southbound |      |      |       | Nahanton Street Eastbound |      |      |       | Nahanton Street Westbound |      |      |       |
|------------|------------|------|------|-------|------------------------------|------|------|-------|---------------------------|------|------|-------|---------------------------|------|------|-------|
|            | U-Turn     | Left | Thru | Right | U-Turn                       | Left | Thru | Right | U-Turn                    | Left | Thru | Right | U-Turn                    | Left | Thru | Right |
| 11:00 AM   | 0          | 0    | 0    | 0     | 0                            | 0    | 0    | 0     | 0                         | 0    | 0    | 0     | 0                         | 0    | 0    | 0     |
| 11:15 AM   | 0          | 0    | 0    | 0     | 0                            | 0    | 0    | 0     | 0                         | 0    | 1    | 0     | 0                         | 0    | 0    | 0     |
| 11:30 AM   | 0          | 0    | 0    | 0     | 0                            | 0    | 0    | 0     | 0                         | 0    | 0    | 0     | 0                         | 0    | 1    | 0     |
| 11:45 AM   | 0          | 0    | 0    | 0     | 0                            | 0    | 0    | 0     | 0                         | 0    | 0    | 0     | 0                         | 0    | 0    | 0     |
| 12:00 PM   | 0          | 0    | 0    | 0     | 0                            | 0    | 0    | 0     | 0                         | 0    | 0    | 0     | 0                         | 0    | 1    | 0     |
| 12:15 PM   | 0          | 0    | 0    | 0     | 0                            | 0    | 0    | 0     | 0                         | 0    | 1    | 0     | 0                         | 0    | 0    | 0     |
| 12:30 PM   | 0          | 0    | 0    | 0     | 0                            | 0    | 0    | 0     | 0                         | 0    | 0    | 0     | 0                         | 0    | 0    | 1     |
| 12:45 PM   | 0          | 0    | 0    | 0     | 0                            | 1    | 0    | 0     | 0                         | 0    | 0    | 0     | 0                         | 0    | 1    | 0     |
| 1:00 PM    | 0          | 0    | 0    | 0     | 0                            | 0    | 0    | 0     | 0                         | 0    | 0    | 0     | 0                         | 0    | 0    | 0     |
| 1:15 AM    | 0          | 0    | 0    | 0     | 0                            | 0    | 0    | 0     | 0                         | 1    | 0    | 0     | 0                         | 0    | 0    | 0     |
| 1:30 AM    | 0          | 0    | 0    | 0     | 0                            | 0    | 0    | 0     | 0                         | 0    | 0    | 0     | 0                         | 0    | 0    | 0     |
| 1:45 AM    | 0          | 0    | 0    | 0     | 0                            | 0    | 0    | 0     | 0                         | 0    | 0    | 0     | 0                         | 0    | 0    | 0     |

|                                            |            |      |      |       |                              |      |      |       |                           |      |      |       |                           |      |      |       |  |
|--------------------------------------------|------------|------|------|-------|------------------------------|------|------|-------|---------------------------|------|------|-------|---------------------------|------|------|-------|--|
| SAT PEAK HOUR<br>12:00 PM<br>to<br>1:00 PM | Northbound |      |      |       | Winchester Street Southbound |      |      |       | Nahanton Street Eastbound |      |      |       | Nahanton Street Westbound |      |      |       |  |
|                                            | U-Turn     | Left | Thru | Right | U-Turn                       | Left | Thru | Right | U-Turn                    | Left | Thru | Right | U-Turn                    | Left | Thru | Right |  |
|                                            | 0          |      |      |       | 0                            | 1    | 0    | 0     | 0                         | 0    | 1    | 0     | 0                         | 0    | 2    | 1     |  |
| PHF                                        |            | 0.00 |      |       |                              | 0.25 |      |       |                           | 0.25 |      |       |                           | 0.75 |      |       |  |

Client: Matt Duranleau  
Project #: 12239.00\_127\_018\_VHB  
BTD #: Location 15  
Location: Newton, MA  
Street 1: Nahanton Street  
Street 2: Winchester Street  
Count Date: 10/28/2017  
Day of Week: Saturday  
Weather: Sun w/ Clouds, 65°F



PEDESTRIANS & BICYCLES

| Start Time | Northbound |      |       |     | Winchester Street Southbound |      |       |     | Nahanton Street Eastbound |      |       |     | Nahanton Street Westbound |      |       |     |
|------------|------------|------|-------|-----|------------------------------|------|-------|-----|---------------------------|------|-------|-----|---------------------------|------|-------|-----|
|            | Left       | Thru | Right | PED | Left                         | Thru | Right | PED | Left                      | Thru | Right | PED | Left                      | Thru | Right | PED |
| 11:00 AM   | 0          | 0    | 0     | 0   | 0                            | 0    | 0     | 0   | 0                         | 1    | 0     | 0   | 0                         | 2    | 0     | 0   |
| 11:15 AM   | 0          | 0    | 0     | 0   | 0                            | 0    | 0     | 0   | 1                         | 4    | 0     | 0   | 0                         | 2    | 0     | 0   |
| 11:30 AM   | 0          | 0    | 0     | 0   | 0                            | 0    | 0     | 0   | 0                         | 3    | 0     | 0   | 0                         | 1    | 0     | 0   |
| 11:45 AM   | 0          | 0    | 0     | 0   | 0                            | 0    | 1     | 0   | 0                         | 1    | 0     | 0   | 0                         | 2    | 0     | 0   |
| 12:00 PM   | 0          | 0    | 0     | 0   | 0                            | 0    | 0     | 0   | 0                         | 2    | 0     | 0   | 0                         | 2    | 0     | 0   |
| 12:15 PM   | 0          | 0    | 0     | 0   | 0                            | 0    | 0     | 0   | 0                         | 4    | 0     | 0   | 0                         | 4    | 0     | 0   |
| 12:30 PM   | 0          | 0    | 0     | 0   | 0                            | 0    | 0     | 0   | 0                         | 3    | 0     | 0   | 0                         | 2    | 0     | 0   |
| 12:45 PM   | 0          | 0    | 0     | 0   | 0                            | 0    | 0     | 0   | 0                         | 2    | 0     | 0   | 0                         | 3    | 1     | 0   |
| 1:00 PM    | 0          | 0    | 0     | 0   | 0                            | 0    | 1     | 0   | 0                         | 0    | 0     | 0   | 0                         | 4    | 0     | 0   |
| 1:15 AM    | 0          | 0    | 0     | 0   | 0                            | 0    | 0     | 0   | 0                         | 1    | 0     | 0   | 0                         | 2    | 0     | 0   |
| 1:30 AM    | 0          | 0    | 0     | 0   | 0                            | 0    | 0     | 0   | 0                         | 2    | 0     | 0   | 0                         | 2    | 0     | 0   |
| 1:45 AM    | 0          | 0    | 0     | 0   | 0                            | 0    | 0     | 0   | 0                         | 0    | 0     | 0   | 0                         | 1    | 0     | 0   |

|                                            |            |      |       |     |                              |      |       |     |                           |      |       |     |                           |      |       |     |
|--------------------------------------------|------------|------|-------|-----|------------------------------|------|-------|-----|---------------------------|------|-------|-----|---------------------------|------|-------|-----|
| SAT PEAK HOUR<br>12:30 PM<br>to<br>1:30 AM | Northbound |      |       |     | Winchester Street Southbound |      |       |     | Nahanton Street Eastbound |      |       |     | Nahanton Street Westbound |      |       |     |
|                                            | Left       | Thru | Right | PED | Left                         | Thru | Right | PED | Left                      | Thru | Right | PED | Left                      | Thru | Right | PED |
|                                            | 0          | 0    | 0     | 0   | 0                            | 0    | 0     | 1   | 0                         | 0    | 0     | 0   | 0                         | 11   | 1     | 0   |

\* Peak hours corresponds to vehicular peak hours.

Client: Matt Duranleau  
Project #: 12239.00\_127\_018\_VHB  
BTD #: Location 16  
Location: Needham, MA  
Street 1: Highland Avenue  
Street 2: Riverside Street  
Count Date: 10/28/2017  
Day of Week: Saturday  
Weather: Sun w/ Clouds, 65°F



**TOTAL (CARS & TRUCKS)**

| Start Time | Highland Avenue Northeastbound |      |      | Highland Avenue Southwestbound |        |      | Riverside Street Northwestbound |       |        | Southeastbound |      |       |
|------------|--------------------------------|------|------|--------------------------------|--------|------|---------------------------------|-------|--------|----------------|------|-------|
|            | U-Turn                         | Left | Thru | Right                          | U-Turn | Left | Thru                            | Right | U-Turn | Left           | Thru | Right |
| 11:00 AM   | 0                              | 0    | 149  | 0                              | 0      | 1    | 218                             | 0     | 0      | 1              | 0    | 0     |
| 11:15 AM   | 0                              | 0    | 163  | 1                              | 0      | 2    | 223                             | 0     | 0      | 2              | 0    | 0     |
| 11:30 AM   | 0                              | 0    | 167  | 1                              | 0      | 2    | 228                             | 0     | 0      | 1              | 0    | 0     |
| 11:45 AM   | 0                              | 0    | 171  | 2                              | 0      | 1    | 230                             | 0     | 0      | 0              | 0    | 0     |
| 12:00 PM   | 0                              | 0    | 175  | 1                              | 0      | 3    | 228                             | 0     | 0      | 1              | 0    | 0     |
| 12:15 PM   | 0                              | 0    | 178  | 0                              | 0      | 2    | 232                             | 0     | 0      | 1              | 0    | 0     |
| 12:30 PM   | 0                              | 0    | 177  | 0                              | 0      | 1    | 229                             | 0     | 0      | 0              | 0    | 0     |
| 12:45 PM   | 0                              | 0    | 175  | 1                              | 0      | 2    | 213                             | 0     | 0      | 3              | 0    | 0     |
| 1:00 PM    | 0                              | 0    | 183  | 1                              | 0      | 1    | 209                             | 0     | 0      | 0              | 0    | 0     |
| 1:15 AM    | 0                              | 0    | 189  | 0                              | 0      | 1    | 192                             | 0     | 0      | 1              | 0    | 0     |
| 1:30 AM    | 0                              | 0    | 182  | 1                              | 0      | 0    | 198                             | 0     | 0      | 1              | 0    | 0     |
| 1:45 AM    | 0                              | 0    | 179  | 0                              | 0      | 1    | 194                             | 0     | 0      | 0              | 0    | 0     |

| SAT PEAK HOUR<br>11:45 AM<br>to<br>12:45 PM<br><br>PHF<br>HV % | Highland Avenue<br>Northeastbound |      |      |       | Highland Avenue<br>Southwestbound |      |      |       | Riverside Street<br>Northwestbound |      |      |       | Southeastbound |      |      |       |
|----------------------------------------------------------------|-----------------------------------|------|------|-------|-----------------------------------|------|------|-------|------------------------------------|------|------|-------|----------------|------|------|-------|
|                                                                | U-Turn                            | Left | Thru | Right | U-Turn                            | Left | Thru | Right | U-Turn                             | Left | Thru | Right | U-Turn         | Left | Thru | Right |
|                                                                | 0                                 | 0    | 701  | 3     | 0                                 | 7    | 919  | 0     | 0                                  | 2    | 0    | 7     | 0              | 0    | 0    | 0     |
|                                                                | 0.99                              |      |      |       |                                   | 0.99 |      |       |                                    |      | 0.56 |       |                |      |      | 0.00  |
|                                                                | 0.0%                              | 0.0% | 0.3% | 0.0%  | 0.0%                              | 0.0% | 0.2% | 0.0%  | 0.0%                               | 0.0% | 0.0% | 0.0%  | 0.0%           | 0.0% | 0.0% | 0.0%  |

11/10/2017, 5:32 PM, 12239.00\_127\_018\_TMC\_Loc 16 (Saturday)

Client: Matt Duranleau  
Project #: 12239.00\_127\_018\_VHB  
BTD #: Location 16  
Location: Needham, MA  
Street 1: Highland Avenue  
Street 2: Riverside Street  
Count Date: 10/28/2017  
Day of Week: Saturday  
Weather: Sun w/ Clouds, 65°F



**TRUCKS**

| Start Time | Highland Avenue Northeastbound |      |      | Highland Avenue Southwestbound |        |      | Riverside Street Northwestbound |       |        | Southeastbound |      |       |
|------------|--------------------------------|------|------|--------------------------------|--------|------|---------------------------------|-------|--------|----------------|------|-------|
|            | U-Turn                         | Left | Thru | Right                          | U-Turn | Left | Thru                            | Right | U-Turn | Left           | Thru | Right |
| 11:00 AM   | 0                              | 0    | 1    | 0                              | 0      | 0    | 0                               | 0     | 0      | 0              | 0    | 0     |
| 11:15 AM   | 0                              | 0    | 0    | 0                              | 0      | 0    | 2                               | 0     | 0      | 0              | 0    | 0     |
| 11:30 AM   | 0                              | 0    | 1    | 0                              | 0      | 0    | 0                               | 0     | 0      | 0              | 0    | 0     |
| 11:45 AM   | 0                              | 0    | 0    | 0                              | 0      | 0    | 1                               | 0     | 0      | 0              | 0    | 0     |
| 12:00 PM   | 0                              | 0    | 0    | 0                              | 0      | 0    | 0                               | 0     | 0      | 0              | 0    | 0     |
| 12:15 PM   | 0                              | 0    | 1    | 0                              | 0      | 0    | 1                               | 0     | 0      | 0              | 0    | 0     |
| 12:30 PM   | 0                              | 0    | 1    | 0                              | 0      | 0    | 0                               | 0     | 0      | 0              | 0    | 0     |
| 12:45 PM   | 0                              | 0    | 1    | 0                              | 0      | 0    | 1                               | 0     | 0      | 0              | 0    | 0     |
| 1:00 PM    | 0                              | 0    | 0    | 0                              | 0      | 0    | 0                               | 0     | 0      | 0              | 0    | 0     |
| 1:15 AM    | 0                              | 0    | 1    | 0                              | 0      | 0    | 1                               | 0     | 0      | 0              | 0    | 0     |
| 1:30 AM    | 0                              | 0    | 0    | 0                              | 0      | 0    | 1                               | 0     | 0      | 0              | 0    | 0     |
| 1:45 AM    | 0                              | 0    | 0    | 0                              | 0      | 0    | 0                               | 0     | 0      | 0              | 0    | 0     |

| SAT PEAK HOUR<br>11:00 AM<br>to<br>12:00 PM<br><br>PHF | Highland Avenue<br>Northeastbound |      |      |       | Highland Avenue<br>Southwestbound |      |      |       | Riverside Street<br>Northwestbound |      |      |       | Southeastbound |      |      |       |
|--------------------------------------------------------|-----------------------------------|------|------|-------|-----------------------------------|------|------|-------|------------------------------------|------|------|-------|----------------|------|------|-------|
|                                                        | U-Turn                            | Left | Thru | Right | U-Turn                            | Left | Thru | Right | U-Turn                             | Left | Thru | Right | U-Turn         | Left | Thru | Right |
|                                                        | 0                                 | 0    | 2    | 0     | 0                                 | 0    | 3    | 0     | 0                                  | 0    | 0    | 0     | 0              | 0    | 0    | 0     |
|                                                        | 0.50                              |      |      |       | 0.38                              |      |      |       | 0.00                               |      |      |       | 0.00           |      |      |       |

11/10/2017, 5:32 PM, 12239.00\_127\_018\_TMC\_Loc 16 (Saturday)



Client: Matt Duranleau  
Project #: 12239.00\_127\_018\_VHB  
BTD #: Location 16  
Location: Needham, MA  
Street 1: Highland Avenue  
Street 2: Riverside Street  
Count Date: 10/26/2017  
Day of Week: Saturday  
Weather: Sun w/ Clouds, 65°F



PEDESTRIANS & BICYCLES

| Highland Avenue<br>Northwestbound |      |      |       |     | Highland Avenue<br>Southwestbound |      |       |     |      | Riverside Street<br>Northwestbound |       |     |      |      | Southeastbound |     |  |  |  |
|-----------------------------------|------|------|-------|-----|-----------------------------------|------|-------|-----|------|------------------------------------|-------|-----|------|------|----------------|-----|--|--|--|
| Start Time                        | Left | Thru | Right | PED | Left                              | Thru | Right | PED | Left | Thru                               | Right | PED | Left | Thru | Right          | PED |  |  |  |
| 11:00 AM                          | 0    | 1    | 0     | 0   | 0                                 | 1    | 0     | 0   | 0    | 0                                  | 0     | 1   | 0    | 0    | 0              | 0   |  |  |  |
| 11:15 AM                          | 0    | 0    | 0     | 0   | 0                                 | 0    | 0     | 0   | 0    | 0                                  | 0     | 0   | 0    | 0    | 0              | 0   |  |  |  |
| 11:30 AM                          | 0    | 1    | 0     | 0   | 0                                 | 0    | 0     | 0   | 0    | 0                                  | 0     | 2   | 0    | 0    | 0              | 0   |  |  |  |
| 11:45 AM                          | 0    | 0    | 0     | 0   | 0                                 | 1    | 0     | 0   | 0    | 0                                  | 0     | 0   | 0    | 0    | 0              | 0   |  |  |  |
| 12:00 PM                          | 0    | 1    | 0     | 0   | 0                                 | 0    | 0     | 0   | 0    | 0                                  | 0     | 1   | 0    | 0    | 0              | 0   |  |  |  |
| 12:15 PM                          | 0    | 0    | 0     | 0   | 0                                 | 1    | 0     | 0   | 0    | 0                                  | 0     | 2   | 0    | 0    | 0              | 0   |  |  |  |
| 12:30 PM                          | 0    | 0    | 0     | 0   | 0                                 | 0    | 0     | 0   | 0    | 0                                  | 0     | 1   | 0    | 0    | 0              | 0   |  |  |  |
| 12:45 PM                          | 0    | 1    | 0     | 0   | 0                                 | 0    | 0     | 0   | 0    | 0                                  | 0     | 0   | 0    | 0    | 0              | 0   |  |  |  |
| 1:00 PM                           | 0    | 0    | 0     | 0   | 0                                 | 0    | 0     | 0   | 0    | 0                                  | 0     | 2   | 0    | 0    | 0              | 0   |  |  |  |
| 1:15 PM                           | 0    | 1    | 0     | 0   | 0                                 | 0    | 0     | 0   | 0    | 0                                  | 0     | 1   | 0    | 0    | 0              | 0   |  |  |  |
| 1:30 AM                           | 0    | 0    | 0     | 0   | 0                                 | 1    | 0     | 0   | 0    | 0                                  | 0     | 1   | 0    | 0    | 0              | 0   |  |  |  |
| 1:45 PM                           | 0    | 0    | 0     | 0   | 0                                 | 0    | 0     | 0   | 0    | 0                                  | 0     | 1   | 0    | 0    | 0              | 0   |  |  |  |

| Highland Avenue<br>Northwestbound |      |       |     | Highland Avenue<br>Southwestbound |      |       |     | Riverside Street<br>Northwestbound |      |       |     | Southeastbound |      |       |     |
|-----------------------------------|------|-------|-----|-----------------------------------|------|-------|-----|------------------------------------|------|-------|-----|----------------|------|-------|-----|
| Left                              | Thru | Right | PED | Left                              | Thru | Right | PED | Left                               | Thru | Right | PED | Left           | Thru | Right | PED |
| 0                                 | 1    | 0     | 0   | 0                                 | 2    | 0     | 0   | 0                                  | 0    | 0     | 4   | 0              | 0    | 0     | 0   |

Peak hours corresponds to vehicular peak hours.

Client: Matt Duranleau  
Project #: 12239.00\_127\_018\_VHB  
BTD #: Location 17  
Location: Needham, MA  
Street 1: Highland Avenue  
Street 2: Highland Terrace / Highland Circle  
Count Date: 10/26/2017  
Day of Week: Saturday  
Weather: Sun w/ Clouds, 65°F



TOTAL (CARS & TRUCKS)

| Highland Avenue<br>Northwestbound |        |      |      |       | Highland Avenue<br>Southwestbound |      |      |       |        | Highland Terrace<br>Northwestbound |      |       |        |      | Highland Circle<br>Southeastbound |       |  |  |  |
|-----------------------------------|--------|------|------|-------|-----------------------------------|------|------|-------|--------|------------------------------------|------|-------|--------|------|-----------------------------------|-------|--|--|--|
| Start Time                        | U-Turn | Left | Thru | Right | U-Turn                            | Left | Thru | Right | U-Turn | Left                               | Thru | Right | U-Turn | Left | Thru                              | Right |  |  |  |
| 11:00 AM                          | 0      | 3    | 148  | 4     | 0                                 | 0    | 219  | 0     | 0      | 0                                  | 1    | 1     | 0      | 0    | 0                                 | 1     |  |  |  |
| 11:15 AM                          | 0      | 2    | 162  | 3     | 0                                 | 1    | 224  | 0     | 0      | 1                                  | 0    | 2     | 0      | 1    | 0                                 | 3     |  |  |  |
| 11:30 AM                          | 0      | 3    | 167  | 2     | 0                                 | 1    | 227  | 1     | 0      | 2                                  | 0    | 1     | 0      | 0    | 0                                 | 2     |  |  |  |
| 11:45 AM                          | 0      | 2    | 172  | 2     | 0                                 | 0    | 228  | 1     | 0      | 3                                  | 0    | 0     | 0      | 1    | 0                                 | 3     |  |  |  |
| 12:00 PM                          | 0      | 2    | 175  | 1     | 0                                 | 1    | 229  | 0     | 0      | 3                                  | 0    | 1     | 0      | 2    | 0                                 | 2     |  |  |  |
| 12:15 PM                          | 0      | 3    | 173  | 2     | 0                                 | 0    | 232  | 1     | 0      | 2                                  | 0    | 2     | 0      | 2    | 0                                 | 2     |  |  |  |
| 12:30 PM                          | 0      | 2    | 174  | 2     | 0                                 | 0    | 229  | 0     | 0      | 3                                  | 0    | 2     | 0      | 1    | 0                                 | 1     |  |  |  |
| 12:45 PM                          | 0      | 2    | 175  | 3     | 0                                 | 1    | 215  | 0     | 0      | 2                                  | 0    | 1     | 0      | 0    | 0                                 | 2     |  |  |  |
| 1:00 PM                           | 0      | 1    | 182  | 3     | 0                                 | 1    | 207  | 1     | 0      | 3                                  | 0    | 1     | 0      | 1    | 0                                 | 3     |  |  |  |
| 1:15 AM                           | 0      | 2    | 186  | 2     | 0                                 | 0    | 193  | 0     | 0      | 2                                  | 0    | 2     | 0      | 1    | 0                                 | 3     |  |  |  |
| 1:30 AM                           | 0      | 1    | 183  | 2     | 0                                 | 1    | 197  | 1     | 0      | 2                                  | 0    | 1     | 0      | 0    | 0                                 | 2     |  |  |  |
| 1:45 AM                           | 0      | 0    | 177  | 1     | 0                                 | 0    | 193  | 1     | 0      | 3                                  | 0    | 1     | 0      | 1    | 0                                 | 2     |  |  |  |

| Highland Avenue<br>Northwestbound |      |      |       | Highland Avenue<br>Southwestbound |      |      |       | Highland Terrace<br>Northwestbound |      |      |       | Highland Circle<br>Southeastbound |      |      |       |
|-----------------------------------|------|------|-------|-----------------------------------|------|------|-------|------------------------------------|------|------|-------|-----------------------------------|------|------|-------|
| U-Turn                            | Left | Thru | Right | U-Turn                            | Left | Thru | Right | U-Turn                             | Left | Thru | Right | U-Turn                            | Left | Thru | Right |
| 0                                 | 9    | 694  | 7     | 0                                 | 1    | 918  | 2     | 0                                  | 11   | 0    | 5     | 0                                 | 6    | 0    | 8     |
| PHF                               |      |      |       | 0.99                              |      |      |       | 0.80                               |      |      |       | 0.88                              |      |      |       |
| HV %                              |      |      |       | 0.0%                              |      |      |       | 0.0%                               |      |      |       | 0.0%                              |      |      |       |

Client: Matt Duranleau  
Project #: 12239.00\_127\_018\_VHB  
BTD #: Location 17  
Location: Needham, MA  
Street 1: Highland Avenue  
Street 2: Highland Terrace / Highland Circle  
Count Date: 10/28/2017  
Day of Week: Saturday  
Weather: Sun w/ Clouds, 65°F



**TRUCKS**

| Highland Avenue<br>Northeastbound |        |      |      |       | Highland Avenue<br>Southwestbound |      |      |       |        | Highland Terrace<br>Northwestbound |      |       |        |      | Highland Circle<br>Southeastbound |       |  |  |  |
|-----------------------------------|--------|------|------|-------|-----------------------------------|------|------|-------|--------|------------------------------------|------|-------|--------|------|-----------------------------------|-------|--|--|--|
| Start Time                        | U-Turn | Left | Thru | Right | U-Turn                            | Left | Thru | Right | U-Turn | Left                               | Thru | Right | U-Turn | Left | Thru                              | Right |  |  |  |
| 11:00 AM                          | 0      | 0    | 1    | 0     | 0                                 | 0    | 0    | 0     | 0      | 0                                  | 0    | 0     | 0      | 0    | 0                                 | 0     |  |  |  |
| 11:15 AM                          | 0      | 0    | 0    | 0     | 0                                 | 0    | 2    | 0     | 0      | 0                                  | 0    | 0     | 0      | 0    | 0                                 | 0     |  |  |  |
| 11:30 AM                          | 0      | 0    | 1    | 0     | 0                                 | 0    | 0    | 0     | 0      | 0                                  | 0    | 0     | 0      | 0    | 0                                 | 0     |  |  |  |
| 11:45 AM                          | 0      | 0    | 0    | 0     | 0                                 | 1    | 0    | 0     | 0      | 0                                  | 0    | 0     | 0      | 0    | 0                                 | 0     |  |  |  |
| 12:00 PM                          | 0      | 0    | 0    | 0     | 0                                 | 0    | 0    | 0     | 0      | 0                                  | 0    | 0     | 0      | 0    | 0                                 | 0     |  |  |  |
| 12:15 PM                          | 0      | 0    | 1    | 0     | 0                                 | 0    | 0    | 0     | 0      | 0                                  | 0    | 0     | 0      | 0    | 0                                 | 0     |  |  |  |
| 12:30 PM                          | 0      | 0    | 2    | 0     | 0                                 | 0    | 1    | 0     | 0      | 0                                  | 0    | 0     | 0      | 0    | 0                                 | 0     |  |  |  |
| 12:45 PM                          | 0      | 0    | 0    | 0     | 0                                 | 0    | 1    | 0     | 0      | 0                                  | 0    | 0     | 0      | 0    | 0                                 | 0     |  |  |  |
| 1:00 PM                           | 0      | 0    | 1    | 0     | 0                                 | 0    | 0    | 0     | 0      | 0                                  | 0    | 0     | 0      | 0    | 0                                 | 0     |  |  |  |
| 1:15 AM                           | 0      | 0    | 0    | 0     | 0                                 | 0    | 0    | 0     | 0      | 0                                  | 0    | 0     | 0      | 0    | 0                                 | 0     |  |  |  |
| 1:30 AM                           | 0      | 0    | 0    | 0     | 0                                 | 2    | 0    | 0     | 0      | 0                                  | 0    | 0     | 0      | 0    | 0                                 | 0     |  |  |  |
| 1:45 AM                           | 0      | 0    | 0    | 0     | 0                                 | 0    | 0    | 0     | 0      | 0                                  | 0    | 0     | 0      | 0    | 0                                 | 0     |  |  |  |
| <b>SAT PEAK HOUR</b>              |        |      |      |       |                                   |      |      |       |        |                                    |      |       |        |      |                                   |       |  |  |  |
| 12:15 PM to 1:15 AM               |        |      |      |       |                                   |      |      |       |        |                                    |      |       |        |      |                                   |       |  |  |  |
| Highland Avenue<br>Northeastbound |        |      |      |       | Highland Avenue<br>Southwestbound |      |      |       |        | Highland Terrace<br>Northwestbound |      |       |        |      | Highland Circle<br>Southeastbound |       |  |  |  |
| U-Turn Left Thru Right            |        |      |      |       | U-Turn Left Thru Right            |      |      |       |        | U-Turn Left Thru Right             |      |       |        |      | U-Turn Left Thru Right            |       |  |  |  |
| 0 0 4                             |        |      |      |       | 0 0 2                             |      |      |       |        | 0 0 0                              |      |       |        |      | 0 0 0                             |       |  |  |  |
| PHF 0.50                          |        |      |      |       | PHF 0.50                          |      |      |       |        | PHF 0.00                           |      |       |        |      | PHF 0.00                          |       |  |  |  |

Client: Matt Duranleau  
Project #: 12239.00\_127\_018\_VHB  
BTD #: Location 17  
Location: Needham, MA  
Street 1: Highland Avenue  
Street 2: Highland Terrace / Highland Circle  
Count Date: 10/28/2017  
Day of Week: Saturday  
Weather: Sun w/ Clouds, 65°F



**PEDESTRIANS & BICYCLES**

| Highland Avenue<br>Northeastbound               |      |      |       |                                   | Highland Avenue<br>Southwestbound |      |       |                                    |      | Highland Terrace<br>Southwestbound |       |                                   |      |      | Highland Circle<br>Southeastbound |     |  |  |  |
|-------------------------------------------------|------|------|-------|-----------------------------------|-----------------------------------|------|-------|------------------------------------|------|------------------------------------|-------|-----------------------------------|------|------|-----------------------------------|-----|--|--|--|
| Start Time                                      | Left | Thru | Right | PED                               | Left                              | Thru | Right | PED                                | Left | Thru                               | Right | PED                               | Left | Thru | Right                             | PED |  |  |  |
| 11:00 AM                                        | 0    | 1    | 0     | 0                                 | 0                                 | 1    | 0     | 0                                  | 0    | 0                                  | 0     | 1                                 | 0    | 0    | 0                                 | 0   |  |  |  |
| 11:15 AM                                        | 0    | 0    | 0     | 0                                 | 0                                 | 0    | 0     | 0                                  | 0    | 0                                  | 0     | 1                                 | 0    | 0    | 0                                 | 0   |  |  |  |
| 11:30 AM                                        | 0    | 1    | 0     | 0                                 | 0                                 | 0    | 0     | 0                                  | 0    | 0                                  | 0     | 0                                 | 0    | 0    | 0                                 | 0   |  |  |  |
| 11:45 AM                                        | 0    | 0    | 0     | 0                                 | 0                                 | 1    | 0     | 0                                  | 0    | 0                                  | 0     | 2                                 | 0    | 0    | 0                                 | 1   |  |  |  |
| 12:00 PM                                        | 0    | 1    | 0     | 0                                 | 0                                 | 0    | 0     | 0                                  | 0    | 0                                  | 0     | 1                                 | 0    | 0    | 0                                 | 2   |  |  |  |
| 12:15 PM                                        | 0    | 0    | 0     | 0                                 | 0                                 | 0    | 0     | 0                                  | 0    | 0                                  | 0     | 3                                 | 0    | 0    | 0                                 | 0   |  |  |  |
| 12:30 PM                                        | 0    | 1    | 0     | 0                                 | 0                                 | 1    | 0     | 0                                  | 0    | 0                                  | 0     | 0                                 | 0    | 0    | 0                                 | 0   |  |  |  |
| 12:45 PM                                        | 0    | 0    | 0     | 0                                 | 0                                 | 0    | 0     | 0                                  | 0    | 0                                  | 0     | 1                                 | 0    | 0    | 0                                 | 0   |  |  |  |
| 1:00 PM                                         | 0    | 0    | 0     | 0                                 | 0                                 | 0    | 0     | 0                                  | 0    | 0                                  | 0     | 2                                 | 0    | 0    | 0                                 | 1   |  |  |  |
| 1:15 AM                                         | 0    | 1    | 0     | 0                                 | 0                                 | 0    | 0     | 0                                  | 0    | 0                                  | 0     | 1                                 | 0    | 0    | 0                                 | 0   |  |  |  |
| 1:30 AM                                         | 0    | 0    | 0     | 0                                 | 0                                 | 1    | 0     | 0                                  | 0    | 0                                  | 0     | 2                                 | 0    | 0    | 0                                 | 1   |  |  |  |
| 1:45 AM                                         | 0    | 0    | 0     | 0                                 | 0                                 | 0    | 0     | 0                                  | 0    | 0                                  | 0     | 0                                 | 0    | 0    | 0                                 | 1   |  |  |  |
| <b>SAT PEAK HOUR</b>                            |      |      |       |                                   |                                   |      |       |                                    |      |                                    |       |                                   |      |      |                                   |     |  |  |  |
| 11:45 AM to 12:45 PM                            |      |      |       |                                   |                                   |      |       |                                    |      |                                    |       |                                   |      |      |                                   |     |  |  |  |
| Highland Avenue<br>Northeastbound               |      |      |       | Highland Avenue<br>Southwestbound |                                   |      |       | Highland Terrace<br>Southwestbound |      |                                    |       | Highland Circle<br>Southeastbound |      |      |                                   |     |  |  |  |
| Left Thru Right PED                             |      |      |       | Left Thru Right PED               |                                   |      |       | Left Thru Right PED                |      |                                    |       | Left Thru Right PED               |      |      |                                   |     |  |  |  |
| 0 2 0 0                                         |      |      |       | 0 2 0 0                           |                                   |      |       | 0 0 0 0                            |      |                                    |       | 0 0 0 0 0 3                       |      |      |                                   |     |  |  |  |
| Peak hours corresponds to vehicular peak hours. |      |      |       |                                   |                                   |      |       |                                    |      |                                    |       |                                   |      |      |                                   |     |  |  |  |

Client: Matt Duranleau  
Project #: 12239.00\_127\_018\_VHB  
BTD #: Location 18  
Location: Needham, MA  
Street 1: Highland Avenue  
Street 2: Charles Street  
Count Date: 10/28/2017  
Day of Week: Saturday  
Weather: Sun w/ Clouds, 65°F



**TOTAL (CARS & TRUCKS)**

| Start Time | Highland Avenue Northeastbound |      |      | Highland Avenue Southwestbound |        |      | Northwestbound |       |        | Charles Street Southeastbound |      |       |
|------------|--------------------------------|------|------|--------------------------------|--------|------|----------------|-------|--------|-------------------------------|------|-------|
|            | U-Turn                         | Left | Thru | Right                          | U-Turn | Left | Thru           | Right | U-Turn | Left                          | Thru | Right |
| 11:00 AM   | 0                              | 7    | 123  | 0                              | 0      | 0    | 226            | 2     | 0      | 0                             | 0    | 16    |
| 11:15 AM   | 0                              | 6    | 136  | 0                              | 0      | 0    | 234            | 3     | 0      | 0                             | 7    | 20    |
| 11:30 AM   | 0                              | 7    | 141  | 0                              | 0      | 0    | 237            | 4     | 0      | 0                             | 6    | 24    |
| 11:45 AM   | 0                              | 8    | 150  | 0                              | 0      | 0    | 239            | 6     | 0      | 0                             | 5    | 32    |
| 12:00 PM   | 0                              | 6    | 154  | 0                              | 0      | 0    | 238            | 5     | 0      | 0                             | 4    | 38    |
| 12:15 PM   | 0                              | 9    | 157  | 0                              | 0      | 0    | 247            | 3     | 0      | 0                             | 6    | 34    |
| 12:30 PM   | 0                              | 11   | 154  | 0                              | 0      | 0    | 253            | 4     | 0      | 0                             | 7    | 29    |
| 12:45 PM   | 0                              | 13   | 152  | 0                              | 0      | 0    | 249            | 6     | 0      | 0                             | 9    | 26    |
| 1:00 PM    | 0                              | 14   | 149  | 0                              | 0      | 0    | 252            | 5     | 0      | 0                             | 11   | 21    |
| 1:15 AM    | 0                              | 12   | 150  | 0                              | 0      | 0    | 245            | 6     | 0      | 0                             | 10   | 24    |
| 1:30 AM    | 0                              | 10   | 144  | 0                              | 0      | 0    | 248            | 4     | 0      | 0                             | 9    | 22    |
| 1:45 AM    | 0                              | 9    | 141  | 0                              | 0      | 0    | 243            | 5     | 0      | 0                             | 8    | 23    |

| SAT PEAK HOUR<br>12:15 PM to 1:15 AM | Highland Avenue Northeastbound |      |      | Highland Avenue Southwestbound |        |      | Northwestbound |       |        | Charles Street Southeastbound |      |       |
|--------------------------------------|--------------------------------|------|------|--------------------------------|--------|------|----------------|-------|--------|-------------------------------|------|-------|
|                                      | U-Turn                         | Left | Thru | Right                          | U-Turn | Left | Thru           | Right | U-Turn | Left                          | Thru | Right |
|                                      | 0                              | 47   | 612  | 0                              | 0      | 0    | 1001           | 18    | 0      | 0                             | 33   | 110   |
| PHF                                  | 0.99                           |      |      | 0.99                           |        |      | 0.00           |       |        | 0.89                          |      |       |
| PH %                                 | 0.0%                           | 0.0% | 0.7% | 0.0%                           | 0.0%   | 0.0% | 0.6%           | 0.0%  | 0.0%   | 0.0%                          | 0.0% | 0.0%  |

Client: Matt Duranleau  
Project #: 12239.00\_127\_018\_VHB  
BTD #: Location 18  
Location: Needham, MA  
Street 1: Highland Avenue  
Street 2: Charles Street  
Count Date: 10/28/2017  
Day of Week: Saturday  
Weather: Sun w/ Clouds, 65°F



**TRUCKS**

| Start Time | Highland Avenue Northeastbound |      |      | Highland Avenue Southwestbound |        |      | Northwestbound |       |        | Charles Street Southeastbound |      |       |
|------------|--------------------------------|------|------|--------------------------------|--------|------|----------------|-------|--------|-------------------------------|------|-------|
|            | U-Turn                         | Left | Thru | Right                          | U-Turn | Left | Thru           | Right | U-Turn | Left                          | Thru | Right |
| 11:00 AM   | 0                              | 0    | 0    | 0                              | 0      | 0    | 1              | 0     | 0      | 0                             | 0    | 0     |
| 11:15 AM   | 0                              | 0    | 0    | 0                              | 0      | 0    | 4              | 0     | 0      | 0                             | 0    | 0     |
| 11:30 AM   | 0                              | 0    | 1    | 0                              | 0      | 0    | 1              | 0     | 0      | 0                             | 0    | 0     |
| 11:45 AM   | 0                              | 0    | 0    | 0                              | 0      | 0    | 2              | 0     | 0      | 0                             | 0    | 0     |
| 12:00 PM   | 0                              | 0    | 0    | 0                              | 0      | 0    | 2              | 0     | 0      | 0                             | 0    | 0     |
| 12:15 PM   | 0                              | 0    | 1    | 0                              | 0      | 0    | 1              | 0     | 0      | 0                             | 0    | 0     |
| 12:30 PM   | 0                              | 0    | 2    | 0                              | 0      | 0    | 2              | 0     | 0      | 0                             | 0    | 0     |
| 12:45 PM   | 0                              | 0    | 0    | 0                              | 0      | 0    | 3              | 0     | 0      | 0                             | 0    | 0     |
| 1:00 PM    | 0                              | 0    | 1    | 0                              | 0      | 0    | 0              | 0     | 0      | 0                             | 0    | 0     |
| 1:15 AM    | 0                              | 0    | 0    | 0                              | 0      | 0    | 1              | 0     | 0      | 0                             | 0    | 0     |
| 1:30 AM    | 0                              | 0    | 0    | 0                              | 0      | 0    | 2              | 0     | 0      | 0                             | 0    | 0     |
| 1:45 AM    | 0                              | 0    | 0    | 0                              | 0      | 0    | 1              | 0     | 0      | 0                             | 0    | 0     |

| SAT PEAK HOUR<br>12:00 PM to 1:00 PM | Highland Avenue Northeastbound |      |      | Highland Avenue Southwestbound |        |      | Northwestbound |       |        | Charles Street Southeastbound |      |       |
|--------------------------------------|--------------------------------|------|------|--------------------------------|--------|------|----------------|-------|--------|-------------------------------|------|-------|
|                                      | U-Turn                         | Left | Thru | Right                          | U-Turn | Left | Thru           | Right | U-Turn | Left                          | Thru | Right |
|                                      | 0                              | 0    | 3    | 0                              | 0      | 0    | 8              | 0     | 0      | 0                             | 0    | 0     |
| PHF                                  | 0.38                           |      |      | 0.67                           |        |      | 0.00           |       |        | 0.00                          |      |       |

Client: Matt Duranleau  
Project #: 12239.00\_127\_018\_VHB  
BTD #: Location 18  
Location: Needham, MA  
Street 1: Highland Avenue  
Street 2: Charles Street  
Count Date: 10/26/2017  
Day of Week: Saturday  
Weather: Sun w/ Clouds, 65°F



PEDESTRIANS & BICYCLES

| Highland Avenue<br>Northwestbound |      |      |       |     | Highland Avenue<br>Southeastbound |      |       |     |      | Northwestbound |       |     |      |      | Charles Street<br>Southeastbound |     |      |      |       |
|-----------------------------------|------|------|-------|-----|-----------------------------------|------|-------|-----|------|----------------|-------|-----|------|------|----------------------------------|-----|------|------|-------|
| Start Time                        | Left | Thru | Right | PED | Left                              | Thru | Right | PED | Left | Thru           | Right | PED | Left | Thru | Right                            | PED | Left | Thru | Right |
| 11:00 AM                          | 0    | 0    | 0     | 0   | 0                                 | 1    | 0     | 0   | 0    | 0              | 0     | 0   | 0    | 0    | 0                                | 0   | 0    | 0    | 1     |
| 11:15 AM                          | 0    | 0    | 0     | 0   | 0                                 | 0    | 0     | 0   | 0    | 0              | 0     | 0   | 0    | 0    | 0                                | 0   | 0    | 0    | 0     |
| 11:30 AM                          | 0    | 1    | 0     | 0   | 0                                 | 0    | 0     | 0   | 0    | 0              | 0     | 0   | 0    | 0    | 0                                | 0   | 0    | 0    | 0     |
| 11:45 AM                          | 0    | 0    | 0     | 0   | 0                                 | 0    | 0     | 0   | 0    | 0              | 0     | 0   | 0    | 0    | 0                                | 0   | 0    | 0    | 1     |
| 12:00 PM                          | 0    | 0    | 0     | 0   | 0                                 | 1    | 0     | 0   | 0    | 0              | 0     | 0   | 0    | 0    | 0                                | 0   | 0    | 0    | 1     |
| 12:15 PM                          | 0    | 0    | 0     | 0   | 0                                 | 0    | 0     | 0   | 0    | 0              | 0     | 0   | 0    | 0    | 0                                | 0   | 0    | 0    | 0     |
| 12:30 PM                          | 0    | 1    | 0     | 0   | 0                                 | 0    | 0     | 0   | 0    | 0              | 0     | 0   | 0    | 0    | 0                                | 0   | 0    | 0    | 2     |
| 12:45 PM                          | 0    | 0    | 0     | 0   | 0                                 | 1    | 0     | 0   | 0    | 0              | 0     | 0   | 0    | 0    | 0                                | 0   | 0    | 0    | 0     |
| 1:00 PM                           | 0    | 0    | 0     | 0   | 0                                 | 0    | 0     | 0   | 0    | 0              | 0     | 0   | 0    | 0    | 0                                | 0   | 0    | 0    | 1     |
| 1:15 AM                           | 0    | 1    | 0     | 0   | 0                                 | 0    | 0     | 0   | 0    | 0              | 0     | 0   | 0    | 0    | 0                                | 0   | 0    | 0    | 0     |
| 1:30 AM                           | 0    | 0    | 0     | 0   | 0                                 | 0    | 0     | 0   | 0    | 0              | 0     | 0   | 0    | 0    | 0                                | 0   | 0    | 0    | 1     |
| 1:45 AM                           | 0    | 0    | 0     | 0   | 0                                 | 1    | 0     | 0   | 0    | 0              | 0     | 0   | 0    | 0    | 0                                | 0   | 0    | 0    | 1     |

| Highland Avenue<br>Northwestbound |      |      |       |     | Highland Avenue<br>Southeastbound |      |       |     |      | Northwestbound |       |     |      |      | Charles Street<br>Southeastbound |     |      |      |       |
|-----------------------------------|------|------|-------|-----|-----------------------------------|------|-------|-----|------|----------------|-------|-----|------|------|----------------------------------|-----|------|------|-------|
| Start Time                        | Left | Thru | Right | PED | Left                              | Thru | Right | PED | Left | Thru           | Right | PED | Left | Thru | Right                            | PED | Left | Thru | Right |
| 12:15 PM                          | 0    | 1    | 0     | 0   | 0                                 | 0    | 1     | 0   | 0    | 0              | 0     | 0   | 0    | 0    | 0                                | 0   | 0    | 0    | 0     |
| 1:15 AM                           | 0    | 1    | 0     | 0   | 0                                 | 0    | 0     | 0   | 0    | 0              | 0     | 0   | 0    | 0    | 0                                | 0   | 0    | 0    | 0     |

Peak hours corresponds to vehicular peak hours.

Client: Matt Duranleau  
Project #: 12239.00\_127\_018\_VHB  
BTD #: Location 19  
Location: Needham, MA  
Street 1: Highland Avenue  
Street 2: Wexford Street  
Count Date: 10/26/2017  
Day of Week: Saturday  
Weather: Sun w/ Clouds, 65°F



TOTAL (CARS & TRUCKS)

| Highland Avenue<br>Northwestbound |        |      |      |       | Highland Avenue<br>Southeastbound |      |      |       |        | Northwestbound |      |       |        |      | Wexford Street<br>Southeastbound |       |        |      |      |
|-----------------------------------|--------|------|------|-------|-----------------------------------|------|------|-------|--------|----------------|------|-------|--------|------|----------------------------------|-------|--------|------|------|
| Start Time                        | U-Turn | Left | Thru | Right | U-Turn                            | Left | Thru | Right | U-Turn | Left           | Thru | Right | U-Turn | Left | Thru                             | Right | U-Turn | Left | Thru |
| 11:00 AM                          | 3      | 34   | 122  | 0     | 0                                 | 0    | 232  | 10    | 0      | 0              | 0    | 0     | 0      | 0    | 8                                | 0     | 0      | 0    | 41   |
| 11:15 AM                          | 0      | 33   | 136  | 0     | 0                                 | 0    | 246  | 8     | 0      | 0              | 0    | 0     | 0      | 0    | 6                                | 0     | 0      | 0    | 38   |
| 11:30 AM                          | 0      | 31   | 141  | 0     | 0                                 | 0    | 252  | 9     | 0      | 0              | 0    | 0     | 0      | 0    | 7                                | 0     | 0      | 0    | 39   |
| 11:45 AM                          | 1      | 29   | 150  | 0     | 0                                 | 0    | 261  | 10    | 0      | 0              | 0    | 0     | 0      | 0    | 8                                | 0     | 0      | 0    | 40   |
| 12:00 PM                          | 0      | 26   | 154  | 0     | 0                                 | 0    | 267  | 9     | 0      | 0              | 0    | 0     | 0      | 0    | 6                                | 0     | 0      | 0    | 38   |
| 12:15 PM                          | 1      | 24   | 158  | 0     | 0                                 | 0    | 270  | 11    | 0      | 0              | 0    | 0     | 0      | 0    | 8                                | 0     | 0      | 0    | 36   |
| 12:30 PM                          | 0      | 21   | 156  | 0     | 0                                 | 0    | 274  | 8     | 0      | 0              | 0    | 0     | 0      | 0    | 9                                | 0     | 0      | 0    | 32   |
| 12:45 PM                          | 1      | 20   | 155  | 0     | 0                                 | 0    | 266  | 9     | 0      | 0              | 0    | 0     | 0      | 0    | 10                               | 0     | 0      | 0    | 31   |
| 1:00 PM                           | 1      | 18   | 152  | 0     | 0                                 | 0    | 265  | 8     | 0      | 0              | 0    | 0     | 0      | 0    | 11                               | 0     | 0      | 0    | 29   |
| 1:15 AM                           | 0      | 21   | 153  | 0     | 0                                 | 0    | 269  | 10    | 0      | 0              | 0    | 0     | 0      | 0    | 9                                | 0     | 0      | 0    | 32   |
| 1:30 AM                           | 1      | 19   | 144  | 0     | 0                                 | 0    | 261  | 9     | 0      | 0              | 0    | 0     | 0      | 0    | 10                               | 0     | 0      | 0    | 31   |
| 1:45 AM                           | 0      | 17   | 141  | 0     | 0                                 | 0    | 258  | 8     | 0      | 0              | 0    | 0     | 0      | 0    | 9                                | 0     | 0      | 0    | 29   |

| SAT PEAK HOUR<br>11:45 AM<br>to<br>12:45 PM |  | Highland Avenue<br>Northbound |      |      |       | Highland Avenue<br>Southbound |      |      |       | Northwestbound |      |      |       | Wexford Street<br>Southbound |      |      |       |      |
|---------------------------------------------|--|-------------------------------|------|------|-------|-------------------------------|------|------|-------|----------------|------|------|-------|------------------------------|------|------|-------|------|
|                                             |  | U-Turn                        | Left | Thru | Right | U-Turn                        | Left | Thru | Right | U-Turn         | Left | Thru | Right | U-Turn                       | Left | Thru | Right |      |
|                                             |  | 2                             | 100  | 618  | 0     | 0                             | 0    | 1072 | 38    | 0              | 0    | 0    | 0     | 0                            | 31   | 0    | 0     | 146  |
|                                             |  | 0.98                          |      |      |       | 0.98                          |      |      |       | 0.00           |      |      |       | 0.92                         |      |      |       |      |
|                                             |  | PHF                           | 0.0% | 0.0% | 0.5%  | 0.0%                          | 0.0% | 0.0% | 0.7%  | 0.0%           | 0.0% | 0.0% | 0.0%  | 0.0%                         | 0.0% | 0.0% | 0.0%  | 0.0% |

Client: Matt Duranleau  
Project #: 12239.00\_127\_018\_VHB  
BTD #: Location 19  
Location: Needham, MA  
Street 1: Highland Avenue  
Street 2: Wexford Street  
Count Date: 10/28/2017  
Day of Week: Saturday  
Weather: Sun w/ Clouds, 65°F



**TRUCKS**

| Start Time | Highland Avenue Northeastbound |      |      |       | Highland Avenue Southwestbound |      |      |       | Northwestbound |      |      |       | Wexford Street Southeastbound |      |      |       |
|------------|--------------------------------|------|------|-------|--------------------------------|------|------|-------|----------------|------|------|-------|-------------------------------|------|------|-------|
|            | U-Turn                         | Left | Thru | Right | U-Turn                         | Left | Thru | Right | U-Turn         | Left | Thru | Right | U-Turn                        | Left | Thru | Right |
| 11:00 AM   | 0                              | 0    | 0    | 0     | 0                              | 1    | 0    | 0     | 0              | 0    | 0    | 0     | 0                             | 0    | 0    | 1     |
| 11:15 AM   | 0                              | 0    | 0    | 0     | 0                              | 3    | 0    | 0     | 0              | 0    | 0    | 0     | 0                             | 0    | 0    | 0     |
| 11:30 AM   | 0                              | 0    | 1    | 0     | 0                              | 2    | 0    | 0     | 0              | 0    | 0    | 0     | 0                             | 0    | 0    | 0     |
| 11:45 AM   | 0                              | 0    | 0    | 0     | 0                              | 2    | 0    | 0     | 0              | 0    | 0    | 0     | 0                             | 0    | 0    | 0     |
| 12:00 PM   | 0                              | 0    | 1    | 0     | 0                              | 2    | 0    | 0     | 0              | 0    | 0    | 0     | 0                             | 0    | 0    | 0     |
| 12:15 PM   | 0                              | 0    | 1    | 0     | 0                              | 1    | 0    | 0     | 0              | 0    | 0    | 0     | 0                             | 0    | 0    | 0     |
| 12:30 PM   | 0                              | 0    | 1    | 0     | 0                              | 2    | 0    | 0     | 0              | 0    | 0    | 0     | 0                             | 0    | 0    | 0     |
| 12:45 PM   | 0                              | 0    | 0    | 0     | 0                              | 2    | 0    | 0     | 0              | 0    | 0    | 0     | 0                             | 0    | 0    | 0     |
| 1:00 PM    | 0                              | 0    | 1    | 0     | 0                              | 1    | 0    | 0     | 0              | 0    | 0    | 0     | 0                             | 0    | 0    | 0     |
| 1:15 AM    | 0                              | 0    | 0    | 0     | 0                              | 1    | 0    | 0     | 0              | 0    | 0    | 0     | 0                             | 0    | 0    | 0     |
| 1:30 AM    | 0                              | 0    | 0    | 0     | 0                              | 2    | 0    | 0     | 0              | 0    | 0    | 0     | 0                             | 0    | 0    | 0     |
| 1:45 AM    | 0                              | 0    | 0    | 0     | 0                              | 1    | 0    | 0     | 0              | 0    | 0    | 0     | 0                             | 0    | 0    | 0     |

| SAT PEAK HOUR<br>11:15 AM<br>to<br>12:15 PM | Highland Avenue Northeastbound |      |      |       | Highland Avenue Southwestbound |      |      |       | Northwestbound |      |      |       | Wexford Street Southeastbound |      |      |       |
|---------------------------------------------|--------------------------------|------|------|-------|--------------------------------|------|------|-------|----------------|------|------|-------|-------------------------------|------|------|-------|
|                                             | U-Turn                         | Left | Thru | Right | U-Turn                         | Left | Thru | Right | U-Turn         | Left | Thru | Right | U-Turn                        | Left | Thru | Right |
|                                             | 0                              | 0    | 2    | 0     | 0                              | 0    | 9    | 0     | 0              | 0    | 0    | 0     | 0                             | 0    | 0    | 0     |
| PHF                                         | 0.50                           |      |      |       | 0.75                           |      |      |       | 0.00           |      |      |       | 0.00                          |      |      |       |

Client: Matt Duranleau  
Project #: 12239.00\_127\_018\_VHB  
BTD #: Location 19  
Location: Needham, MA  
Street 1: Highland Avenue  
Street 2: Wexford Street  
Count Date: 10/28/2017  
Day of Week: Saturday  
Weather: Sun w/ Clouds, 65°F



**PEDESTRIANS & BICYCLES**

| Start Time | Highland Avenue Northeastbound |      |       |     | Highland Avenue Southwestbound |      |       |     | Northwestbound |      |       |     | Wexford Street Southeastbound |      |       |     |
|------------|--------------------------------|------|-------|-----|--------------------------------|------|-------|-----|----------------|------|-------|-----|-------------------------------|------|-------|-----|
|            | Left                           | Thru | Right | PED | Left                           | Thru | Right | PED | Left           | Thru | Right | PED | Left                          | Thru | Right | PED |
| 11:00 AM   | 0                              | 0    | 0     | 0   | 0                              | 0    | 1     | 0   | 0              | 0    | 0     | 0   | 0                             | 0    | 0     | 1   |
| 11:15 AM   | 0                              | 0    | 0     | 0   | 0                              | 1    | 0     | 0   | 0              | 0    | 0     | 0   | 0                             | 0    | 0     | 0   |
| 11:30 AM   | 0                              | 1    | 0     | 0   | 0                              | 0    | 0     | 0   | 0              | 0    | 0     | 0   | 0                             | 0    | 0     | 0   |
| 11:45 AM   | 0                              | 0    | 0     | 0   | 0                              | 0    | 0     | 0   | 0              | 0    | 0     | 0   | 0                             | 0    | 0     | 1   |
| 12:00 PM   | 0                              | 0    | 0     | 0   | 0                              | 1    | 0     | 0   | 0              | 0    | 0     | 0   | 0                             | 0    | 0     | 0   |
| 12:15 PM   | 0                              | 0    | 0     | 0   | 0                              | 0    | 0     | 0   | 0              | 0    | 0     | 0   | 1                             | 0    | 0     | 0   |
| 12:30 PM   | 0                              | 1    | 0     | 0   | 0                              | 0    | 0     | 0   | 0              | 0    | 0     | 0   | 0                             | 0    | 0     | 0   |
| 12:45 PM   | 0                              | 0    | 0     | 0   | 0                              | 0    | 0     | 0   | 0              | 0    | 0     | 0   | 0                             | 0    | 0     | 1   |
| 1:00 PM    | 0                              | 0    | 0     | 0   | 0                              | 1    | 0     | 0   | 0              | 0    | 0     | 0   | 0                             | 0    | 0     | 1   |
| 1:15 AM    | 0                              | 1    | 0     | 0   | 0                              | 0    | 0     | 0   | 0              | 0    | 0     | 0   | 0                             | 0    | 0     | 0   |
| 1:30 AM    | 0                              | 0    | 0     | 0   | 0                              | 0    | 0     | 0   | 0              | 0    | 0     | 0   | 0                             | 0    | 0     | 1   |
| 1:45 AM    | 0                              | 0    | 0     | 0   | 0                              | 1    | 0     | 0   | 0              | 0    | 0     | 0   | 0                             | 0    | 0     | 0   |

| SAT PEAK HOUR<br>11:45 AM<br>to<br>12:45 PM | Highland Avenue Northeastbound |      |       |     | Highland Avenue Southwestbound |      |       |     | Northwestbound |      |       |     | Wexford Street Southeastbound |      |       |     |
|---------------------------------------------|--------------------------------|------|-------|-----|--------------------------------|------|-------|-----|----------------|------|-------|-----|-------------------------------|------|-------|-----|
|                                             | Left                           | Thru | Right | PED | Left                           | Thru | Right | PED | Left           | Thru | Right | PED | Left                          | Thru | Right | PED |
|                                             | 0                              | 1    | 0     | 0   | 0                              | 1    | 0     | 0   | 0              | 0    | 0     | 0   | 1                             | 0    | 0     | 1   |

\* Peak hours corresponds to vehicular peak hours.

Client: Matt Duranleau  
Project #: 12239.00\_127\_018\_VHB  
BTD #: Location 20  
Location: Newton, MA  
Street 1: Needham Street  
Street 2: Oak Street / Christina Street  
Count Date: 10/28/2017  
Day of Week: Saturday  
Weather: Sun w/ Clouds, 65°F



**TOTAL (CARS & TRUCKS)**

| Start Time | Needham Street Northbound |      |      | Needham Street Southbound |        |      | Oak Street Eastbound |       |        | Christina Street Westbound |      |       |
|------------|---------------------------|------|------|---------------------------|--------|------|----------------------|-------|--------|----------------------------|------|-------|
|            | U-Turn                    | Left | Thru | Right                     | U-Turn | Left | Thru                 | Right | U-Turn | Left                       | Thru | Right |
| 11:00 AM   | 0                         | 23   | 168  | 9                         | 0      | 7    | 175                  | 29    | 0      | 57                         | 20   | 52    |
| 11:15 AM   | 0                         | 26   | 130  | 11                        | 0      | 8    | 170                  | 31    | 0      | 61                         | 18   | 49    |
| 11:30 AM   | 0                         | 27   | 144  | 12                        | 0      | 9    | 165                  | 34    | 0      | 60                         | 16   | 44    |
| 11:45 AM   | 0                         | 30   | 122  | 14                        | 0      | 8    | 163                  | 35    | 0      | 61                         | 14   | 38    |
| 12:00 PM   | 0                         | 32   | 145  | 15                        | 0      | 9    | 141                  | 38    | 0      | 59                         | 11   | 31    |
| 12:15 PM   | 0                         | 30   | 147  | 16                        | 0      | 7    | 166                  | 37    | 0      | 60                         | 13   | 34    |
| 12:30 PM   | 0                         | 27   | 131  | 14                        | 0      | 9    | 143                  | 35    | 0      | 57                         | 14   | 35    |
| 12:45 PM   | 0                         | 26   | 120  | 13                        | 0      | 8    | 142                  | 32    | 0      | 59                         | 16   | 39    |
| 1:00 PM    | 0                         | 24   | 144  | 12                        | 0      | 6    | 172                  | 30    | 0      | 58                         | 17   | 42    |
| 1:15 AM    | 0                         | 28   | 130  | 14                        | 0      | 4    | 160                  | 27    | 0      | 62                         | 16   | 40    |
| 1:30 AM    | 0                         | 26   | 136  | 13                        | 0      | 5    | 167                  | 28    | 0      | 61                         | 15   | 37    |
| 1:45 AM    | 0                         | 23   | 149  | 12                        | 0      | 6    | 159                  | 26    | 0      | 57                         | 14   | 39    |

| SAT PEAK HOUR<br>11:00 AM<br>to<br>12:00 PM | Needham Street Northbound |      |      | Needham Street Southbound |        |      | Oak Street Eastbound |       |        | Christina Street Westbound |      |       |
|---------------------------------------------|---------------------------|------|------|---------------------------|--------|------|----------------------|-------|--------|----------------------------|------|-------|
|                                             | U-Turn                    | Left | Thru | Right                     | U-Turn | Left | Thru                 | Right | U-Turn | Left                       | Thru | Right |
|                                             | 0                         | 106  | 564  | 46                        | 0      | 32   | 673                  | 129   | 0      | 239                        | 68   | 183   |
| PHF                                         | 0.90                      |      |      | 0.99                      |        |      | 0.95                 |       |        | 0.95                       |      |       |
| HV %                                        | 0.0%                      | 0.0% | 0.9% | 0.0%                      | 0.0%   | 3.1% | 0.3%                 | 0.0%  | 0.0%   | 0.4%                       | 0.0% | 0.5%  |

11/10/2017, 5:57 PM, 12239.00\_127\_018\_TMC\_Loc 20 (Saturday)

Client: Matt Duranleau  
Project #: 12239.00\_127\_018\_VHB  
BTD #: Location 20  
Location: Newton, MA  
Street 1: Needham Street  
Street 2: Oak Street / Christina Street  
Count Date: 10/28/2017  
Day of Week: Saturday  
Weather: Sun w/ Clouds, 65°F



**TRUCKS**

| Start Time | Needham Street Northbound |      |      | Needham Street Southbound |        |      | Oak Street Eastbound |       |        | Christina Street Westbound |      |       |
|------------|---------------------------|------|------|---------------------------|--------|------|----------------------|-------|--------|----------------------------|------|-------|
|            | U-Turn                    | Left | Thru | Right                     | U-Turn | Left | Thru                 | Right | U-Turn | Left                       | Thru | Right |
| 11:00 AM   | 0                         | 0    | 3    | 0                         | 0      | 0    | 0                    | 0     | 0      | 1                          | 0    | 0     |
| 11:15 AM   | 0                         | 0    | 1    | 0                         | 0      | 1    | 1                    | 0     | 0      | 0                          | 0    | 1     |
| 11:30 AM   | 0                         | 0    | 1    | 0                         | 0      | 0    | 0                    | 0     | 0      | 0                          | 0    | 0     |
| 11:45 AM   | 0                         | 0    | 0    | 0                         | 0      | 1    | 0                    | 0     | 0      | 0                          | 0    | 0     |
| 12:00 PM   | 0                         | 1    | 1    | 0                         | 0      | 0    | 1                    | 0     | 0      | 0                          | 0    | 1     |
| 12:15 PM   | 0                         | 0    | 1    | 0                         | 0      | 0    | 2                    | 0     | 0      | 0                          | 0    | 0     |
| 12:30 PM   | 0                         | 1    | 0    | 0                         | 0      | 1    | 0                    | 0     | 0      | 0                          | 0    | 0     |
| 12:45 PM   | 0                         | 0    | 0    | 0                         | 0      | 0    | 0                    | 0     | 0      | 1                          | 0    | 0     |
| 1:00 PM    | 0                         | 1    | 0    | 0                         | 0      | 0    | 1                    | 0     | 0      | 1                          | 0    | 0     |
| 1:15 AM    | 0                         | 0    | 1    | 0                         | 0      | 0    | 0                    | 0     | 0      | 2                          | 0    | 0     |
| 1:30 AM    | 0                         | 0    | 0    | 0                         | 0      | 0    | 0                    | 0     | 0      | 1                          | 0    | 0     |
| 1:45 AM    | 0                         | 0    | 0    | 0                         | 0      | 0    | 0                    | 0     | 0      | 0                          | 0    | 0     |

| SAT PEAK HOUR<br>11:45 AM<br>to<br>12:45 PM | Needham Street Northbound |      |      | Needham Street Southbound |        |      | Oak Street Eastbound |       |        | Christina Street Westbound |      |       |
|---------------------------------------------|---------------------------|------|------|---------------------------|--------|------|----------------------|-------|--------|----------------------------|------|-------|
|                                             | U-Turn                    | Left | Thru | Right                     | U-Turn | Left | Thru                 | Right | U-Turn | Left                       | Thru | Right |
|                                             | 0                         | 2    | 2    | 0                         | 0      | 0    | 5                    | 0     | 0      | 0                          | 0    | 1     |
| PHF                                         | 0.50                      |      |      | 0.63                      |        |      | 0.25                 |       |        | 0.25                       |      |       |

11/10/2017, 5:57 PM, 12239.00\_127\_018\_TMC\_Loc 20 (Saturday)

Client: Matt Duranleau  
Project #: 12239.00\_127\_018\_VHB  
BTD #: Location 20  
Location: Newton, MA  
Street 1: Needham Street  
Street 2: Oak Street / Christina Street  
Count Date: 10/26/2017  
Day of Week: Saturday  
Weather: Sun w/ Clouds, 65°F



PEDESTRIANS & BICYCLES

| Needham Street Northbound |      |      |       |     | Needham Street Southbound |      |       |     |      | Oak Street Eastbound |       |     |      |      | Christina Street Westbound |     |      |      |       |
|---------------------------|------|------|-------|-----|---------------------------|------|-------|-----|------|----------------------|-------|-----|------|------|----------------------------|-----|------|------|-------|
| Start Time                | Left | Thru | Right | PED | Left                      | Thru | Right | PED | Left | Thru                 | Right | PED | Left | Thru | Right                      | PED | Left | Thru | Right |
| 11:00 AM                  | 0    | 1    | 0     | 0   | 0                         | 0    | 0     | 4   | 0    | 0                    | 0     | 0   | 0    | 0    | 0                          | 0   | 0    | 0    | 0     |
| 11:15 AM                  | 0    | 0    | 0     | 0   | 0                         | 0    | 0     | 0   | 0    | 0                    | 0     | 0   | 0    | 0    | 0                          | 0   | 0    | 0    | 0     |
| 11:30 AM                  | 0    | 0    | 0     | 0   | 0                         | 1    | 0     | 0   | 0    | 0                    | 0     | 0   | 0    | 0    | 0                          | 0   | 0    | 1    | 0     |
| 11:45 AM                  | 0    | 0    | 0     | 0   | 0                         | 0    | 0     | 1   | 0    | 0                    | 0     | 0   | 0    | 0    | 0                          | 0   | 0    | 0    | 4     |
| 12:00 PM                  | 0    | 1    | 0     | 0   | 0                         | 0    | 0     | 0   | 2    | 0                    | 0     | 0   | 0    | 0    | 0                          | 0   | 0    | 3    | 0     |
| 12:15 PM                  | 0    | 0    | 0     | 0   | 0                         | 0    | 0     | 2   | 0    | 0                    | 0     | 0   | 0    | 0    | 0                          | 0   | 0    | 0    | 0     |
| 12:30 PM                  | 0    | 0    | 0     | 0   | 0                         | 1    | 0     | 0   | 0    | 0                    | 0     | 0   | 0    | 0    | 0                          | 0   | 2    | 0    | 0     |
| 12:45 PM                  | 0    | 0    | 0     | 0   | 0                         | 0    | 0     | 1   | 0    | 0                    | 0     | 0   | 0    | 0    | 0                          | 0   | 0    | 0    | 0     |
| 1:00 PM                   | 0    | 1    | 0     | 0   | 0                         | 0    | 0     | 0   | 0    | 0                    | 0     | 0   | 0    | 0    | 0                          | 0   | 0    | 1    | 0     |
| 1:15 AM                   | 0    | 0    | 0     | 0   | 0                         | 0    | 0     | 2   | 0    | 0                    | 0     | 0   | 0    | 0    | 0                          | 0   | 2    | 0    | 0     |
| 1:30 AM                   | 0    | 0    | 0     | 0   | 0                         | 0    | 0     | 1   | 0    | 0                    | 0     | 0   | 0    | 0    | 0                          | 0   | 1    | 0    | 0     |
| 1:45 AM                   | 0    | 0    | 0     | 0   | 0                         | 0    | 0     | 0   | 0    | 0                    | 0     | 0   | 0    | 0    | 0                          | 0   | 0    | 0    | 0     |

| SAT PEAK HOUR<br>11:00 AM<br>to<br>12:00 PM | Needham Street<br>Northbound |      |       |     | Needham Street<br>Southbound |      |       |     | Oak Street<br>Eastbound |      |       |     | Christina Street<br>Westbound |      |       |     |
|---------------------------------------------|------------------------------|------|-------|-----|------------------------------|------|-------|-----|-------------------------|------|-------|-----|-------------------------------|------|-------|-----|
|                                             | Left                         | Thru | Right | PED | Left                         | Thru | Right | PED | Left                    | Thru | Right | PED | Left                          | Thru | Right | PED |
|                                             | 0                            | 1    | 0     | 0   | 0                            | 0    | 1     | 0   | 5                       | 0    | 0     | 0   | 0                             | 0    | 0     | 0   |

Peak hours corresponds to vehicular peak hours.

Client: Matt Duranleau  
Project #: 12239.00\_127\_018\_VHB  
BTD #: Location 21  
Location: Newton, MA  
Street 1: Needham Street  
Street 2: Tower Road / Industrial Place  
Count Date: 10/26/2017  
Day of Week: Saturday  
Weather: Sun w/ Clouds, 65°F



TOTAL (CARS & TRUCKS)

| Needham Street Northbound |        |      |      |       | Needham Street Southbound |      |      |       |        | Tower Road Eastbound |      |       |        |      | Industrial Place Westbound |       |        |      |      |
|---------------------------|--------|------|------|-------|---------------------------|------|------|-------|--------|----------------------|------|-------|--------|------|----------------------------|-------|--------|------|------|
| Start Time                | U-Turn | Left | Thru | Right | U-Turn                    | Left | Thru | Right | U-Turn | Left                 | Thru | Right | U-Turn | Left | Thru                       | Right | U-Turn | Left | Thru |
| 11:00 AM                  | 0      | 7    | 223  | 5     | 0                         | 3    | 161  | 8     | 0      | 15                   | 4    | 17    | 0      | 8    | 3                          | 14    | 0      | 0    | 0    |
| 11:15 AM                  | 0      | 10   | 181  | 6     | 0                         | 3    | 156  | 10    | 0      | 17                   | 2    | 18    | 0      | 9    | 3                          | 15    | 0      | 0    | 0    |
| 11:30 AM                  | 0      | 12   | 199  | 4     | 0                         | 5    | 153  | 11    | 0      | 16                   | 3    | 19    | 0      | 11   | 4                          | 14    | 0      | 0    | 0    |
| 11:45 AM                  | 0      | 14   | 169  | 5     | 0                         | 4    | 152  | 9     | 0      | 18                   | 4    | 20    | 0      | 10   | 3                          | 13    | 0      | 0    | 0    |
| 12:00 PM                  | 0      | 15   | 192  | 3     | 0                         | 5    | 135  | 10    | 0      | 16                   | 3    | 19    | 0      | 12   | 5                          | 14    | 0      | 0    | 0    |
| 12:15 PM                  | 0      | 14   | 195  | 5     | 0                         | 3    | 156  | 9     | 0      | 16                   | 4    | 21    | 0      | 11   | 6                          | 12    | 0      | 0    | 0    |
| 12:30 PM                  | 0      | 12   | 183  | 4     | 0                         | 4    | 139  | 8     | 0      | 16                   | 3    | 19    | 0      | 10   | 5                          | 13    | 0      | 0    | 0    |
| 12:45 PM                  | 0      | 11   | 166  | 5     | 0                         | 5    | 123  | 9     | 0      | 24                   | 2    | 24    | 0      | 9    | 4                          | 14    | 0      | 0    | 0    |
| 1:00 PM                   | 0      | 10   | 194  | 6     | 0                         | 6    | 159  | 11    | 0      | 16                   | 3    | 21    | 0      | 8    | 3                          | 15    | 0      | 0    | 0    |
| 1:15 AM                   | 0      | 12   | 176  | 6     | 0                         | 7    | 139  | 10    | 0      | 22                   | 4    | 22    | 0      | 7    | 2                          | 16    | 0      | 0    | 0    |
| 1:30 AM                   | 0      | 11   | 191  | 5     | 0                         | 8    | 149  | 8     | 0      | 16                   | 3    | 20    | 0      | 9    | 3                          | 17    | 0      | 0    | 0    |
| 1:45 AM                   | 0      | 10   | 200  | 4     | 0                         | 6    | 141  | 9     | 0      | 21                   | 3    | 22    | 0      | 8    | 3                          | 15    | 0      | 0    | 0    |

| Needham Street Northbound |      |      |       |        | Needham Street Southbound |      |       |        |      | Tower Road Eastbound |       |        |      |      | Industrial Place Westbound |        |      |      |       |
|---------------------------|------|------|-------|--------|---------------------------|------|-------|--------|------|----------------------|-------|--------|------|------|----------------------------|--------|------|------|-------|
| U-Turn                    | Left | Thru | Right | U-Turn | Left                      | Thru | Right | U-Turn | Left | Thru                 | Right | U-Turn | Left | Thru | Right                      | U-Turn | Left | Thru | Right |
| 0                         | 43   | 772  | 20    | 0      | 15                        | 622  | 38    | 0      | 66   | 13                   | 74    | 0      | 38   | 13   | 56                         | 0      | 0    | 0    | 0     |
| PHF                       |      |      |       |        | 0.89                      |      |       |        |      | 0.98                 |       |        |      |      | 0.91                       |        |      |      |       |
| HV %                      |      |      |       |        | 0.0%                      |      |       |        |      | 0.0%                 |       |        |      |      | 0.0%                       |        |      |      |       |

Client: Matt Duranleau  
Project #: 12239.00\_127\_018\_VHB  
BTD #: Location 21  
Location: Newton, MA  
Street 1: Needham Street  
Street 2: Tower Road / Industrial Place  
Count Date: 10/28/2017  
Day of Week: Saturday  
Weather: Sun w/ Clouds, 65°F



TRUCKS

| Start Time           | Needham Street Northbound |      |      |       | Needham Street Southbound |      |      |       | Tower Road Eastbound |      |      |       | Industrial Place Westbound |      |      |       |
|----------------------|---------------------------|------|------|-------|---------------------------|------|------|-------|----------------------|------|------|-------|----------------------------|------|------|-------|
|                      | U-Turn                    | Left | Thru | Right | U-Turn                    | Left | Thru | Right | U-Turn               | Left | Thru | Right | U-Turn                     | Left | Thru | Right |
| 11:00 AM             | 0                         | 0    | 2    | 0     | 0                         | 0    | 1    | 0     | 0                    | 0    | 0    | 0     | 0                          | 0    | 0    | 0     |
| 11:15 AM             | 0                         | 0    | 2    | 0     | 0                         | 0    | 1    | 0     | 0                    | 0    | 0    | 0     | 0                          | 0    | 0    | 0     |
| 11:30 AM             | 0                         | 0    | 1    | 0     | 0                         | 0    | 0    | 0     | 0                    | 0    | 0    | 0     | 0                          | 0    | 0    | 0     |
| 11:45 AM             | 0                         | 0    | 0    | 0     | 0                         | 0    | 2    | 0     | 0                    | 0    | 0    | 0     | 0                          | 0    | 0    | 0     |
| 12:00 PM             | 0                         | 0    | 1    | 0     | 0                         | 0    | 0    | 0     | 0                    | 0    | 0    | 0     | 0                          | 0    | 0    | 0     |
| 12:15 PM             | 0                         | 0    | 0    | 0     | 0                         | 0    | 1    | 0     | 0                    | 0    | 0    | 0     | 0                          | 0    | 0    | 0     |
| 12:30 PM             | 0                         | 0    | 0    | 0     | 0                         | 0    | 2    | 0     | 0                    | 0    | 0    | 0     | 0                          | 0    | 0    | 0     |
| 12:45 PM             | 0                         | 0    | 1    | 0     | 0                         | 0    | 0    | 0     | 0                    | 0    | 0    | 0     | 0                          | 0    | 0    | 0     |
| 1:00 PM              | 0                         | 0    | 0    | 0     | 0                         | 0    | 0    | 0     | 0                    | 0    | 0    | 0     | 0                          | 0    | 0    | 0     |
| 1:15 AM              | 0                         | 0    | 0    | 0     | 0                         | 0    | 1    | 0     | 0                    | 0    | 0    | 0     | 0                          | 0    | 0    | 0     |
| 1:30 AM              | 0                         | 0    | 1    | 0     | 0                         | 0    | 0    | 0     | 0                    | 0    | 0    | 0     | 0                          | 0    | 0    | 0     |
| 1:45 AM              | 0                         | 0    | 0    | 0     | 0                         | 0    | 0    | 0     | 0                    | 0    | 0    | 0     | 0                          | 0    | 0    | 0     |
| SAT PEAK HOUR        |                           |      |      |       |                           |      |      |       |                      |      |      |       |                            |      |      |       |
| 11:00 AM to 12:00 PM | 0                         | 0    | 5    | 0     | 0                         | 0    | 4    | 0     | 0                    | 0    | 0    | 0     | 0                          | 0    | 0    | 0     |
| PHF                  | 0.63                      |      |      |       | 0.50                      |      |      |       | 0.00                 |      |      |       | 0.00                       |      |      |       |

Client: Matt Duranleau  
Project #: 12239.00\_127\_018\_VHB  
BTD #: Location 21  
Location: Newton, MA  
Street 1: Needham Street  
Street 2: Tower Road / Industrial Place  
Count Date: 10/28/2017  
Day of Week: Saturday  
Weather: Sun w/ Clouds, 65°F



PEDESTRIANS & BICYCLES

| Start Time           | Needham Street Northbound |      |       |     | Needham Street Southbound |      |       |     | Tower Road Eastbound |      |       |     | Industrial Place Westbound |      |       |     |
|----------------------|---------------------------|------|-------|-----|---------------------------|------|-------|-----|----------------------|------|-------|-----|----------------------------|------|-------|-----|
|                      | Left                      | Thru | Right | PED | Left                      | Thru | Right | PED | Left                 | Thru | Right | PED | Left                       | Thru | Right | PED |
| 11:00 AM             | 0                         | 1    | 0     | 2   | 0                         | 0    | 0     | 0   | 0                    | 0    | 0     | 3   | 0                          | 0    | 0     | 0   |
| 11:15 AM             | 0                         | 0    | 0     | 5   | 0                         | 0    | 0     | 0   | 0                    | 0    | 0     | 4   | 0                          | 0    | 0     | 12  |
| 11:30 AM             | 0                         | 0    | 0     | 2   | 0                         | 1    | 0     | 0   | 0                    | 0    | 0     | 2   | 0                          | 0    | 0     | 6   |
| 11:45 AM             | 0                         | 1    | 0     | 1   | 0                         | 0    | 0     | 0   | 0                    | 0    | 0     | 3   | 0                          | 0    | 0     | 0   |
| 12:00 PM             | 0                         | 0    | 0     | 1   | 0                         | 0    | 0     | 0   | 0                    | 0    | 0     | 3   | 0                          | 0    | 0     | 2   |
| 12:15 PM             | 0                         | 1    | 0     | 0   | 0                         | 1    | 0     | 0   | 0                    | 0    | 0     | 2   | 0                          | 0    | 0     | 1   |
| 12:30 PM             | 0                         | 0    | 0     | 2   | 0                         | 0    | 0     | 0   | 0                    | 0    | 0     | 4   | 0                          | 0    | 0     | 3   |
| 12:45 PM             | 0                         | 0    | 0     | 1   | 0                         | 0    | 0     | 0   | 0                    | 0    | 0     | 1   | 0                          | 0    | 0     | 2   |
| 1:00 PM              | 0                         | 1    | 0     | 2   | 0                         | 0    | 0     | 0   | 0                    | 0    | 0     | 1   | 0                          | 0    | 0     | 4   |
| 1:15 AM              | 0                         | 0    | 0     | 1   | 0                         | 0    | 0     | 0   | 0                    | 0    | 0     | 0   | 0                          | 0    | 0     | 5   |
| 1:30 AM              | 0                         | 1    | 0     | 0   | 0                         | 0    | 0     | 0   | 0                    | 0    | 0     | 2   | 0                          | 0    | 0     | 2   |
| 1:45 AM              | 0                         | 0    | 0     | 1   | 0                         | 0    | 0     | 0   | 0                    | 0    | 0     | 2   | 0                          | 0    | 0     | 1   |
| SAT PEAK HOUR        |                           |      |       |     |                           |      |       |     |                      |      |       |     |                            |      |       |     |
| 11:00 AM to 12:00 PM | 0                         | 2    | 0     | 10  | 0                         | 1    | 0     | 0   | 0                    | 0    | 0     | 12  | 0                          | 0    | 0     | 31  |

Peak hours corresponds to vehicular peak hours.



Client: Matt Duranleau  
Project #: 12239.00\_127\_018\_VHB  
BTD #: Location 22  
Location: Newton, MA  
Street 1: Needham Street  
Street 2: Columbia Avenue  
Count Date: 10/28/2017  
Day of Week: Saturday  
Weather: Sun w/ Clouds, 65°F



**TOTAL (CARS & TRUCKS)**

| Start Time | Needham Street Northbound |      |      |       | Needham Street Southbound |      |      |       | Avalon Residential Driveway Eastbound |      |      |       | Columbia Avenue Westbound |      |      |       |
|------------|---------------------------|------|------|-------|---------------------------|------|------|-------|---------------------------------------|------|------|-------|---------------------------|------|------|-------|
|            | U-Turn                    | Left | Thru | Right | U-Turn                    | Left | Thru | Right | U-Turn                                | Left | Thru | Right | U-Turn                    | Left | Thru | Right |
| 11:00 AM   | 0                         | 5    | 242  | 1     | 0                         | 1    | 165  | 0     | 0                                     | 2    | 0    | 3     | 0                         | 1    | 1    | 1     |
| 11:15 AM   | 0                         | 4    | 203  | 2     | 0                         | 0    | 160  | 1     | 0                                     | 4    | 0    | 4     | 0                         | 2    | 0    | 2     |
| 11:30 AM   | 0                         | 5    | 220  | 2     | 1                         | 1    | 161  | 1     | 0                                     | 3    | 0    | 4     | 0                         | 3    | 1    | 2     |
| 11:45 AM   | 0                         | 6    | 188  | 4     | 0                         | 1    | 158  | 0     | 0                                     | 3    | 0    | 3     | 0                         | 4    | 1    | 3     |
| 12:00 PM   | 0                         | 5    | 208  | 3     | 0                         | 1    | 141  | 1     | 0                                     | 4    | 0    | 2     | 0                         | 5    | 0    | 3     |
| 12:15 PM   | 0                         | 3    | 211  | 3     | 0                         | 0    | 159  | 1     | 0                                     | 4    | 0    | 3     | 0                         | 4    | 1    | 2     |
| 12:30 PM   | 0                         | 4    | 201  | 2     | 0                         | 2    | 146  | 2     | 0                                     | 3    | 0    | 2     | 0                         | 3    | 1    | 2     |
| 12:45 PM   | 0                         | 3    | 193  | 3     | 0                         | 1    | 134  | 2     | 0                                     | 2    | 0    | 1     | 0                         | 3    | 0    | 3     |
| 1:00 PM    | 0                         | 2    | 215  | 1     | 0                         | 2    | 174  | 1     | 0                                     | 2    | 0    | 2     | 0                         | 2    | 0    | 2     |
| 1:15 AM    | 0                         | 3    | 203  | 2     | 0                         | 2    | 153  | 1     | 0                                     | 1    | 0    | 1     | 0                         | 2    | 1    | 1     |
| 1:30 AM    | 0                         | 2    | 216  | 2     | 0                         | 1    | 160  | 2     | 0                                     | 2    | 0    | 2     | 0                         | 2    | 0    | 2     |
| 1:45 AM    | 0                         | 3    | 230  | 1     | 0                         | 1    | 151  | 1     | 0                                     | 1    | 0    | 2     | 0                         | 1    | 0    | 1     |

| SAT PEAK HOUR<br>11:00 AM<br>to<br>12:00 PM | Needham Street Northbound |      |      |       | Needham Street Southbound |      |      |       | Avalon Residential Driveway Eastbound |      |      |       | Columbia Avenue Westbound |      |      |       |
|---------------------------------------------|---------------------------|------|------|-------|---------------------------|------|------|-------|---------------------------------------|------|------|-------|---------------------------|------|------|-------|
|                                             | U-Turn                    | Left | Thru | Right | U-Turn                    | Left | Thru | Right | U-Turn                                | Left | Thru | Right | U-Turn                    | Left | Thru | Right |
|                                             | 0                         | 20   | 853  | 9     | 1                         | 3    | 644  | 2     | 0                                     | 12   | 0    | 14    | 0                         | 10   | 3    | 8     |
| PHF                                         | 0.89                      |      |      |       | 0.98                      |      |      |       | 0.81                                  |      |      |       | 0.66                      |      |      |       |
| HV %                                        | 0.0%                      | 0.0% | 0.5% | 0.0%  | 0.0%                      | 0.0% | 0.8% | 0.0%  | 0.0%                                  | 0.0% | 0.0% | 0.0%  | 0.0%                      | 0.0% | 0.0% | 0.0%  |

Client: Matt Duranleau  
Project #: 12239.00\_127\_018\_VHB  
BTD #: Location 22  
Location: Newton, MA  
Street 1: Needham Street  
Street 2: Columbia Avenue  
Count Date: 10/28/2017  
Day of Week: Saturday  
Weather: Sun w/ Clouds, 65°F



**TRUCKS**

| Start Time | Needham Street Northbound |      |      |       | Needham Street Southbound |      |      |       | Avalon Residential Driveway Eastbound |      |      |       | Columbia Avenue Westbound |      |      |       |
|------------|---------------------------|------|------|-------|---------------------------|------|------|-------|---------------------------------------|------|------|-------|---------------------------|------|------|-------|
|            | U-Turn                    | Left | Thru | Right | U-Turn                    | Left | Thru | Right | U-Turn                                | Left | Thru | Right | U-Turn                    | Left | Thru | Right |
| 11:00 AM   | 0                         | 0    | 1    | 0     | 0                         | 0    | 1    | 0     | 0                                     | 0    | 0    | 0     | 0                         | 0    | 0    | 0     |
| 11:15 AM   | 0                         | 0    | 2    | 0     | 0                         | 0    | 1    | 0     | 0                                     | 0    | 0    | 0     | 0                         | 0    | 0    | 0     |
| 11:30 AM   | 0                         | 0    | 1    | 0     | 0                         | 0    | 1    | 0     | 0                                     | 0    | 0    | 0     | 0                         | 0    | 0    | 0     |
| 11:45 AM   | 0                         | 0    | 0    | 0     | 0                         | 0    | 2    | 0     | 0                                     | 0    | 0    | 0     | 0                         | 0    | 0    | 0     |
| 12:00 PM   | 0                         | 0    | 1    | 0     | 0                         | 0    | 2    | 0     | 0                                     | 0    | 0    | 0     | 0                         | 0    | 0    | 0     |
| 12:15 PM   | 0                         | 0    | 0    | 0     | 0                         | 0    | 0    | 0     | 0                                     | 0    | 0    | 0     | 0                         | 0    | 0    | 0     |
| 12:30 PM   | 0                         | 0    | 1    | 0     | 0                         | 0    | 1    | 0     | 0                                     | 0    | 0    | 0     | 0                         | 0    | 0    | 0     |
| 12:45 PM   | 0                         | 0    | 1    | 0     | 0                         | 0    | 0    | 0     | 0                                     | 0    | 0    | 0     | 0                         | 0    | 0    | 0     |
| 1:00 PM    | 0                         | 0    | 0    | 0     | 0                         | 0    | 1    | 0     | 0                                     | 0    | 0    | 0     | 0                         | 0    | 0    | 0     |
| 1:15 AM    | 0                         | 0    | 0    | 0     | 0                         | 0    | 0    | 0     | 0                                     | 0    | 0    | 0     | 0                         | 0    | 0    | 0     |
| 1:30 AM    | 0                         | 0    | 1    | 0     | 0                         | 0    | 0    | 0     | 0                                     | 0    | 0    | 0     | 0                         | 0    | 0    | 0     |
| 1:45 AM    | 0                         | 0    | 0    | 0     | 0                         | 0    | 1    | 0     | 0                                     | 0    | 0    | 0     | 0                         | 0    | 0    | 0     |

| SAT PEAK HOUR<br>11:15 AM<br>to<br>12:15 PM | Needham Street Northbound |      |      |       | Needham Street Southbound |      |      |       | Avalon Residential Driveway Eastbound |      |      |       | Columbia Avenue Westbound |      |      |       |
|---------------------------------------------|---------------------------|------|------|-------|---------------------------|------|------|-------|---------------------------------------|------|------|-------|---------------------------|------|------|-------|
|                                             | U-Turn                    | Left | Thru | Right | U-Turn                    | Left | Thru | Right | U-Turn                                | Left | Thru | Right | U-Turn                    | Left | Thru | Right |
|                                             | 0                         | 0    | 4    | 0     | 0                         | 0    | 6    | 0     | 0                                     | 0    | 0    | 0     | 0                         | 0    | 0    | 0     |
| PHF                                         | 0.50                      |      |      |       | 0.75                      |      |      |       | 0.00                                  |      |      |       | 0.00                      |      |      |       |

Client: Matt Duranleau  
Project #: 12239.00\_127\_018\_VHB  
BTD #: Location 22  
Location: Newton, MA  
Street 1: Needham Street  
Street 2: Columbia Avenue  
Count Date: 10/26/2017  
Day of Week: Saturday  
Weather: Sun w/ Clouds, 65°F



PEDESTRIANS & BICYCLES

| Needham Street Northbound |      |      |       |     | Needham Street Southbound |      |       |     |      | Avalon Residential Driveway Eastbound |       |     |      |      | Columbia Avenue Westbound |     |      |      |       |
|---------------------------|------|------|-------|-----|---------------------------|------|-------|-----|------|---------------------------------------|-------|-----|------|------|---------------------------|-----|------|------|-------|
| Start Time                | Left | Thru | Right | PED | Left                      | Thru | Right | PED | Left | Thru                                  | Right | PED | Left | Thru | Right                     | PED | Left | Thru | Right |
| 11:00 AM                  | 0    | 1    | 0     | 0   | 0                         | 0    | 0     | 3   | 0    | 0                                     | 0     | 7   | 0    | 0    | 0                         | 0   | 0    | 0    | 0     |
| 11:15 AM                  | 0    | 0    | 0     | 0   | 0                         | 0    | 0     | 6   | 0    | 0                                     | 0     | 7   | 0    | 0    | 0                         | 0   | 0    | 0    | 3     |
| 11:30 AM                  | 0    | 0    | 0     | 0   | 0                         | 1    | 0     | 2   | 0    | 0                                     | 0     | 5   | 0    | 0    | 0                         | 0   | 0    | 0    | 2     |
| 11:45 AM                  | 0    | 0    | 0     | 0   | 0                         | 0    | 0     | 3   | 0    | 0                                     | 0     | 4   | 0    | 0    | 0                         | 0   | 0    | 0    | 3     |
| 12:00 PM                  | 0    | 1    | 0     | 0   | 0                         | 1    | 0     | 1   | 0    | 0                                     | 0     | 3   | 0    | 0    | 0                         | 0   | 0    | 0    | 2     |
| 12:15 PM                  | 0    | 1    | 0     | 0   | 0                         | 0    | 0     | 2   | 0    | 0                                     | 0     | 3   | 0    | 0    | 0                         | 0   | 0    | 0    | 2     |
| 12:30 PM                  | 0    | 0    | 0     | 0   | 0                         | 0    | 0     | 0   | 0    | 0                                     | 0     | 2   | 0    | 0    | 0                         | 0   | 0    | 0    | 3     |
| 12:45 PM                  | 0    | 1    | 0     | 0   | 0                         | 0    | 0     | 1   | 0    | 0                                     | 0     | 4   | 0    | 0    | 0                         | 0   | 0    | 0    | 4     |
| 1:00 PM                   | 0    | 0    | 0     | 0   | 0                         | 1    | 0     | 3   | 0    | 0                                     | 0     | 2   | 0    | 0    | 0                         | 0   | 0    | 0    | 3     |
| 1:15 AM                   | 0    | 0    | 0     | 0   | 0                         | 0    | 0     | 0   | 0    | 0                                     | 0     | 3   | 0    | 0    | 0                         | 0   | 0    | 0    | 2     |
| 1:30 AM                   | 0    | 1    | 0     | 0   | 0                         | 0    | 0     | 2   | 0    | 0                                     | 0     | 4   | 0    | 0    | 0                         | 0   | 0    | 0    | 1     |
| 1:45 AM                   | 0    | 0    | 0     | 0   | 0                         | 0    | 0     | 2   | 0    | 0                                     | 0     | 3   | 0    | 0    | 0                         | 0   | 0    | 0    | 2     |

| Needham Street Northbound |      |      |       |     | Needham Street Southbound |      |       |     |      | Avalon Residential Driveway Eastbound |       |     |      |      | Columbia Avenue Westbound |     |      |      |       |
|---------------------------|------|------|-------|-----|---------------------------|------|-------|-----|------|---------------------------------------|-------|-----|------|------|---------------------------|-----|------|------|-------|
| SAT PEAK HOUR             | Left | Thru | Right | PED | Left                      | Thru | Right | PED | Left | Thru                                  | Right | PED | Left | Thru | Right                     | PED | Left | Thru | Right |
| 11:00 AM to 12:00 PM      | 0    | 1    | 0     | 0   | 0                         | 1    | 0     | 14  | 0    | 0                                     | 0     | 23  | 0    | 0    | 0                         | 0   | 14   | 0    | 0     |

\* Peak hours corresponds to vehicular peak hours.

11/10/2017, 6:08 PM, 12239.00\_127\_018\_TMC\_Loc 22 (Saturday)

Client: Matt Duranleau  
Project #: 12239.00\_127\_018\_VHB  
BTD #: Location 23  
Location: Newton, MA  
Street 1: Winchester Street  
Street 2: Needham Street / Dedham Street  
Count Date: 10/26/2017  
Day of Week: Saturday  
Weather: Sun w/ Clouds, 65°F



TOTAL (CARS & TRUCKS)

| Winchester Street Northbound |        |      |      |       | Winchester Street Southbound |      |      |       |        | Needham Street Eastbound |      |       |        |      | Dedham Street Westbound |       |        |      |      |
|------------------------------|--------|------|------|-------|------------------------------|------|------|-------|--------|--------------------------|------|-------|--------|------|-------------------------|-------|--------|------|------|
| Start Time                   | U-Turn | Left | Thru | Right | U-Turn                       | Left | Thru | Right | U-Turn | Left                     | Thru | Right | U-Turn | Left | Thru                    | Right | U-Turn | Left | Thru |
| 11:00 AM                     | 0      | 11   | 42   | 1     | 0                            | 7    | 37   | 131   | 0      | 214                      | 16   | 15    | 0      | 4    | 24                      | 17    |        |      |      |
| 11:15 AM                     | 0      | 9    | 41   | 2     | 0                            | 8    | 40   | 126   | 0      | 173                      | 19   | 17    | 0      | 5    | 26                      | 19    |        |      |      |
| 11:30 AM                     | 0      | 10   | 39   | 2     | 0                            | 9    | 44   | 125   | 0      | 188                      | 21   | 16    | 0      | 6    | 28                      | 20    |        |      |      |
| 11:45 AM                     | 0      | 9    | 38   | 3     | 0                            | 10   | 47   | 121   | 0      | 152                      | 24   | 18    | 0      | 5    | 29                      | 21    |        |      |      |
| 12:00 PM                     | 0      | 8    | 35   | 2     | 0                            | 11   | 51   | 103   | 0      | 172                      | 26   | 17    | 0      | 5    | 32                      | 20    |        |      |      |
| 12:15 PM                     | 0      | 9    | 41   | 4     | 0                            | 12   | 53   | 118   | 0      | 171                      | 28   | 18    | 0      | 4    | 33                      | 22    |        |      |      |
| 12:30 PM                     | 0      | 8    | 46   | 3     | 0                            | 13   | 51   | 110   | 0      | 160                      | 29   | 17    | 0      | 6    | 32                      | 23    |        |      |      |
| 12:45 PM                     | 0      | 10   | 53   | 3     | 0                            | 14   | 47   | 97    | 0      | 147                      | 32   | 19    | 0      | 5    | 30                      | 21    |        |      |      |
| 1:00 PM                      | 0      | 7    | 58   | 2     | 0                            | 13   | 44   | 141   | 0      | 169                      | 34   | 16    | 0      | 7    | 29                      | 20    |        |      |      |
| 1:15 AM                      | 0      | 8    | 57   | 2     | 0                            | 15   | 40   | 122   | 0      | 165                      | 33   | 17    | 0      | 5    | 26                      | 19    |        |      |      |
| 1:30 AM                      | 0      | 7    | 53   | 1     | 0                            | 14   | 39   | 130   | 0      | 173                      | 31   | 16    | 0      | 6    | 26                      | 18    |        |      |      |
| 1:45 AM                      | 0      | 6    | 51   | 2     | 0                            | 13   | 37   | 123   | 0      | 188                      | 29   | 15    | 0      | 4    | 24                      | 17    |        |      |      |

| SAT PEAK HOUR<br>1:00 PM<br>to<br>2:00 PM<br><br>PHF<br>HV % | Winchester Street<br>Northbound |      |      |       | Winchester Street<br>Southbound |      |      |       | Needham Street<br>Eastbound |      |      |       | Dedham Street<br>Westbound |      |      |       |
|--------------------------------------------------------------|---------------------------------|------|------|-------|---------------------------------|------|------|-------|-----------------------------|------|------|-------|----------------------------|------|------|-------|
|                                                              | U-Turn                          | Left | Thru | Right | U-Turn                          | Left | Thru | Right | U-Turn                      | Left | Thru | Right | U-Turn                     | Left | Thru | Right |
|                                                              | 0                               | 28   | 219  | 7     | 0                               | 55   | 160  | 516   | 0                           | 685  | 127  | 64    | 0                          | 22   | 105  | 74    |
|                                                              | 0.95                            |      |      |       | 0.92                            |      |      |       | 0.94                        |      |      |       | 0.90                       |      |      |       |
|                                                              | 0.0%                            | 0.0% | 0.5% | 0.0%  | 0.0%                            | 0.0% | 0.6% | 0.4%  | 0.0%                        | 0.3% | 0.0% | 0.0%  | 0.0%                       | 0.0% | 0.0% | 0.0%  |

11/10/2017, 6:14 PM, 12239.00\_127\_018\_TMC\_Loc 23 (Saturday)

Client: Matt Duranleau  
Project #: 12239.00\_127\_018\_VHB  
BTD #: Location 23  
Location: Newton, MA  
Street 1: Winchester Street  
Street 2: Needham Street / Dedham Street  
Count Date: 10/28/2017  
Day of Week: Saturday  
Weather: Sun w/ Clouds, 65°F



#### TRUCKS

| Start Time           | Winchester Street Northbound |      |      |       | Winchester Street Southbound |      |      |       | Needham Street Eastbound |      |      |       | Dedham Street Westbound |      |      |       |
|----------------------|------------------------------|------|------|-------|------------------------------|------|------|-------|--------------------------|------|------|-------|-------------------------|------|------|-------|
|                      | U-Turn                       | Left | Thru | Right | U-Turn                       | Left | Thru | Right | U-Turn                   | Left | Thru | Right | U-Turn                  | Left | Thru | Right |
| 11:00 AM             | 0                            | 0    | 0    | 0     | 0                            | 0    | 0    | 0     | 1                        | 0    | 0    | 0     | 0                       | 0    | 0    | 0     |
| 11:15 AM             | 0                            | 0    | 0    | 0     | 0                            | 0    | 0    | 2     | 0                        | 1    | 0    | 0     | 0                       | 0    | 0    | 0     |
| 11:30 AM             | 0                            | 0    | 0    | 0     | 0                            | 1    | 1    | 0     | 2                        | 0    | 0    | 0     | 0                       | 0    | 0    | 0     |
| 11:45 AM             | 0                            | 0    | 1    | 0     | 0                            | 0    | 2    | 0     | 1                        | 0    | 0    | 0     | 0                       | 0    | 0    | 0     |
| 12:00 PM             | 0                            | 0    | 0    | 0     | 0                            | 1    | 0    | 1     | 0                        | 1    | 0    | 0     | 0                       | 0    | 0    | 0     |
| 12:15 PM             | 0                            | 0    | 0    | 0     | 0                            | 0    | 1    | 1     | 0                        | 0    | 0    | 0     | 0                       | 0    | 0    | 0     |
| 12:30 PM             | 0                            | 0    | 0    | 0     | 0                            | 0    | 1    | 0     | 1                        | 0    | 0    | 0     | 0                       | 0    | 0    | 0     |
| 12:45 PM             | 0                            | 0    | 0    | 0     | 0                            | 0    | 0    | 0     | 0                        | 0    | 0    | 0     | 0                       | 0    | 0    | 0     |
| 1:00 PM              | 0                            | 0    | 1    | 0     | 0                            | 0    | 0    | 1     | 0                        | 1    | 0    | 0     | 0                       | 0    | 0    | 0     |
| 1:15 AM              | 0                            | 0    | 0    | 0     | 0                            | 0    | 1    | 0     | 0                        | 0    | 0    | 0     | 0                       | 0    | 0    | 0     |
| 1:30 AM              | 0                            | 0    | 0    | 0     | 0                            | 0    | 0    | 1     | 0                        | 1    | 0    | 0     | 0                       | 0    | 0    | 0     |
| 1:45 AM              | 0                            | 0    | 0    | 0     | 0                            | 0    | 0    | 0     | 0                        | 0    | 0    | 0     | 0                       | 0    | 0    | 0     |
| <b>SAT PEAK HOUR</b> |                              |      |      |       |                              |      |      |       |                          |      |      |       |                         |      |      |       |
| 11:15 AM to 12:15 PM | 0                            | 0    | 1    | 0     | 0                            | 1    | 1    | 6     | 0                        | 5    | 0    | 0     | 0                       | 0    | 0    | 0     |
| <b>PHF</b>           | <b>0.25</b>                  |      |      |       | <b>1.00</b>                  |      |      |       | <b>0.63</b>              |      |      |       | <b>0.00</b>             |      |      |       |

Client: Matt Duranleau  
Project #: 12239.00\_127\_018\_VHB  
BTD #: Location 23  
Location: Newton, MA  
Street 1: Winchester Street  
Street 2: Needham Street / Dedham Street  
Count Date: 10/28/2017  
Day of Week: Saturday  
Weather: Sun w/ Clouds, 65°F



#### PEDESTRIANS & BICYCLES

| Start Time           | Winchester Street Northbound |      |       |     | Winchester Street Southbound |      |       |     | Needham Street Eastbound |      |       |     | Dedham Street Westbound |      |       |     |
|----------------------|------------------------------|------|-------|-----|------------------------------|------|-------|-----|--------------------------|------|-------|-----|-------------------------|------|-------|-----|
|                      | Left                         | Thru | Right | PED | Left                         | Thru | Right | PED | Left                     | Thru | Right | PED | Left                    | Thru | Right | PED |
| 11:00 AM             | 0                            | 0    | 0     | 2   | 0                            | 1    | 0     | 0   | 0                        | 0    | 0     | 1   | 0                       | 0    | 0     | 3   |
| 11:15 AM             | 0                            | 1    | 0     | 0   | 0                            | 0    | 0     | 2   | 0                        | 0    | 0     | 1   | 0                       | 0    | 0     | 1   |
| 11:30 AM             | 0                            | 1    | 0     | 0   | 0                            | 0    | 0     | 2   | 0                        | 0    | 0     | 1   | 0                       | 0    | 0     | 1   |
| 11:45 AM             | 0                            | 0    | 0     | 1   | 0                            | 1    | 0     | 2   | 0                        | 0    | 0     | 0   | 0                       | 0    | 0     | 1   |
| 12:00 PM             | 0                            | 0    | 0     | 0   | 0                            | 0    | 0     | 3   | 0                        | 0    | 0     | 1   | 0                       | 0    | 0     | 0   |
| 12:15 PM             | 0                            | 1    | 0     | 1   | 0                            | 0    | 0     | 2   | 0                        | 0    | 0     | 2   | 0                       | 0    | 0     | 2   |
| 12:30 PM             | 0                            | 0    | 0     | 1   | 0                            | 0    | 0     | 1   | 0                        | 0    | 0     | 0   | 0                       | 0    | 0     | 0   |
| 12:45 PM             | 0                            | 0    | 0     | 0   | 0                            | 1    | 0     | 3   | 0                        | 0    | 0     | 1   | 0                       | 0    | 0     | 1   |
| 1:00 PM              | 0                            | 0    | 0     | 2   | 0                            | 0    | 0     | 2   | 0                        | 0    | 0     | 1   | 0                       | 0    | 0     | 2   |
| 1:15 AM              | 0                            | 1    | 0     | 1   | 0                            | 0    | 0     | 3   | 0                        | 0    | 0     | 0   | 0                       | 0    | 0     | 1   |
| 1:30 AM              | 0                            | 0    | 0     | 0   | 0                            | 0    | 0     | 3   | 0                        | 0    | 0     | 1   | 0                       | 0    | 0     | 0   |
| 1:45 AM              | 0                            | 0    | 0     | 0   | 0                            | 3    | 0     | 2   | 0                        | 0    | 0     | 0   | 0                       | 0    | 2     | 1   |
| <b>SAT PEAK HOUR</b> |                              |      |       |     |                              |      |       |     |                          |      |       |     |                         |      |       |     |
| 1:00 PM to 2:00 PM   | 0                            | 1    | 0     | 3   | 0                            | 3    | 0     | 10  | 0                        | 0    | 0     | 2   | 0                       | 0    | 2     | 4   |

\* Peak hours corresponds to vehicular peak hours.

Client: Matt Duranleau  
Project #: 12239.00\_127\_018\_VHB  
BTD #: Location 24  
Location: Newton, MA  
Street 1: Winchester Street / Centre Street  
Street 2: Route 9 EB Ramp (Boylston Street)  
Count Date: 10/28/2017  
Day of Week: Saturday  
Weather: Sun w/ Clouds, 65°F



#### TOTAL (CARS & TRUCKS)

| Start Time | Winchester Street Northeastbound |      |      | Centre Street Southwestbound |        |      | Eastbound |       |        | Route 9 EB Ramp (Boylston Street) Westbound |      |       |
|------------|----------------------------------|------|------|------------------------------|--------|------|-----------|-------|--------|---------------------------------------------|------|-------|
|            | U-Turn                           | Left | Thru | Right                        | U-Turn | Left | Thru      | Right | U-Turn | Left                                        | Thru | Right |
| 11:00 AM   | 0                                | 0    | 218  | 55                           | 0      | 26   | 153       | 0     | 0      | 0                                           | 0    | 0     |
| 11:15 AM   | 0                                | 0    | 168  | 65                           | 0      | 23   | 150       | 0     | 0      | 0                                           | 0    | 0     |
| 11:30 AM   | 0                                | 0    | 174  | 73                           | 0      | 25   | 152       | 0     | 0      | 0                                           | 0    | 0     |
| 11:45 AM   | 0                                | 0    | 130  | 81                           | 0      | 24   | 149       | 0     | 0      | 0                                           | 0    | 0     |
| 12:00 PM   | 0                                | 0    | 142  | 85                           | 0      | 23   | 135       | 0     | 0      | 0                                           | 0    | 0     |
| 12:15 PM   | 0                                | 0    | 153  | 81                           | 0      | 28   | 156       | 0     | 0      | 0                                           | 0    | 0     |
| 12:30 PM   | 0                                | 0    | 155  | 74                           | 0      | 32   | 152       | 0     | 0      | 0                                           | 0    | 0     |
| 12:45 PM   | 0                                | 0    | 152  | 69                           | 0      | 36   | 138       | 0     | 0      | 0                                           | 0    | 0     |
| 1:00 PM    | 0                                | 0    | 186  | 61                           | 0      | 39   | 183       | 0     | 0      | 0                                           | 0    | 0     |
| 1:15 AM    | 0                                | 0    | 168  | 63                           | 0      | 37   | 158       | 0     | 0      | 0                                           | 0    | 0     |
| 1:30 AM    | 0                                | 0    | 182  | 62                           | 0      | 34   | 165       | 0     | 0      | 0                                           | 0    | 0     |
| 1:45 AM    | 0                                | 0    | 197  | 59                           | 1      | 32   | 153       | 0     | 0      | 0                                           | 0    | 0     |

| SAT PEAK HOUR<br>1:00 PM<br>to<br>2:00 PM | Winchester Street Northeastbound |      |      | Centre Street Southwestbound |        |      | Eastbound |       |        | Route 9 EB Ramp (Boylston Street) Westbound |      |       |
|-------------------------------------------|----------------------------------|------|------|------------------------------|--------|------|-----------|-------|--------|---------------------------------------------|------|-------|
|                                           | U-Turn                           | Left | Thru | Right                        | U-Turn | Left | Thru      | Right | U-Turn | Left                                        | Thru | Right |
|                                           | 0                                | 0    | 733  | 245                          | 1      | 142  | 659       | 0     | 0      | 0                                           | 74   | 0     |
| PHF                                       | 0.96                             |      |      | 0.90                         |        |      | 0.00      |       |        | 0.96                                        |      |       |
| HV %                                      | 0.0%                             | 0.0% | 0.5% | 0.0%                         | 0.0%   | 0.0% | 0.5%      | 0.0%  | 0.0%   | 0.0%                                        | 0.0% | 0.0%  |

Client: Matt Duranleau  
Project #: 12239.00\_127\_018\_VHB  
BTD #: Location 24  
Location: Newton, MA  
Street 1: Winchester Street / Centre Street  
Street 2: Route 9 EB Ramp (Boylston Street)  
Count Date: 10/28/2017  
Day of Week: Saturday  
Weather: Sun w/ Clouds, 65°F



#### TRUCKS

| Start Time | Winchester Street Northeastbound |      |      | Centre Street Southwestbound |        |      | Eastbound |       |        | Route 9 EB Ramp (Boylston Street) Westbound |      |       |
|------------|----------------------------------|------|------|------------------------------|--------|------|-----------|-------|--------|---------------------------------------------|------|-------|
|            | U-Turn                           | Left | Thru | Right                        | U-Turn | Left | Thru      | Right | U-Turn | Left                                        | Thru | Right |
| 11:00 AM   | 0                                | 0    | 1    | 0                            | 0      | 0    | 0         | 0     | 0      | 0                                           | 0    | 0     |
| 11:15 AM   | 0                                | 0    | 1    | 0                            | 0      | 0    | 1         | 0     | 0      | 0                                           | 0    | 0     |
| 11:30 AM   | 0                                | 0    | 2    | 0                            | 0      | 0    | 2         | 0     | 0      | 0                                           | 0    | 0     |
| 11:45 AM   | 0                                | 0    | 2    | 0                            | 0      | 0    | 2         | 0     | 0      | 0                                           | 0    | 0     |
| 12:00 PM   | 0                                | 0    | 1    | 0                            | 0      | 0    | 3         | 0     | 0      | 0                                           | 0    | 0     |
| 12:15 PM   | 0                                | 0    | 0    | 0                            | 0      | 0    | 1         | 0     | 0      | 0                                           | 0    | 0     |
| 12:30 PM   | 0                                | 0    | 1    | 0                            | 0      | 0    | 1         | 0     | 0      | 0                                           | 0    | 0     |
| 12:45 PM   | 0                                | 0    | 0    | 0                            | 0      | 0    | 0         | 0     | 0      | 0                                           | 1    | 0     |
| 1:00 PM    | 0                                | 0    | 2    | 0                            | 0      | 0    | 1         | 0     | 0      | 0                                           | 0    | 0     |
| 1:15 AM    | 0                                | 0    | 1    | 0                            | 0      | 0    | 1         | 0     | 0      | 0                                           | 0    | 0     |
| 1:30 AM    | 0                                | 0    | 1    | 0                            | 0      | 0    | 1         | 0     | 0      | 0                                           | 0    | 0     |
| 1:45 AM    | 0                                | 0    | 0    | 0                            | 0      | 0    | 0         | 0     | 0      | 0                                           | 0    | 0     |

| SAT PEAK HOUR<br>11:15 AM<br>to<br>12:15 PM | Winchester Street Northeastbound |      |      | Centre Street Southwestbound |        |      | Eastbound |       |        | Route 9 EB Ramp (Boylston Street) Westbound |      |       |
|---------------------------------------------|----------------------------------|------|------|------------------------------|--------|------|-----------|-------|--------|---------------------------------------------|------|-------|
|                                             | U-Turn                           | Left | Thru | Right                        | U-Turn | Left | Thru      | Right | U-Turn | Left                                        | Thru | Right |
|                                             | 0                                | 0    | 6    | 0                            | 0      | 0    | 8         | 0     | 0      | 0                                           | 1    | 0     |
| PHF                                         | 0.75                             |      |      | 0.67                         |        |      | 0.00      |       |        | 0.25                                        |      |       |

Client: Matt Duranleau  
Project #: 12239.00\_127\_018\_VHB  
BTD #: Location 24  
Location: Newton, MA  
Street 1: Winchester Street / Centre Street  
Street 2: Route 9 EB Ramp (Boylston Street)  
Count Date: 10/26/2017  
Day of Week: Saturday  
Weather: Sun w/ Clouds, 65°F



PEDESTRIANS & BICYCLES

| Winchester Street<br>Northwestbound |      |      |       |     | Centre Street<br>Southwestbound |      |       |     |  | Eastbound |      |       |     |  | Route 9 EB Ramp (Boylston Street)<br>Westbound |      |       |     |  |
|-------------------------------------|------|------|-------|-----|---------------------------------|------|-------|-----|--|-----------|------|-------|-----|--|------------------------------------------------|------|-------|-----|--|
| Start Time                          | Left | Thru | Right | PED | Left                            | Thru | Right | PED |  | Left      | Thru | Right | PED |  | Left                                           | Thru | Right | PED |  |
| 11:00 AM                            | 0    | 0    | 0     | 0   | 0                               | 1    | 0     | 0   |  | 0         | 0    | 0     | 0   |  | 0                                              | 0    | 0     | 1   |  |
| 11:15 AM                            | 0    | 0    | 0     | 0   | 0                               | 0    | 0     | 0   |  | 0         | 0    | 0     | 0   |  | 0                                              | 0    | 0     | 0   |  |
| 11:30 AM                            | 0    | 1    | 0     | 0   | 0                               | 1    | 0     | 0   |  | 0         | 0    | 0     | 0   |  | 0                                              | 0    | 0     | 2   |  |
| 11:45 AM                            | 0    | 1    | 0     | 0   | 0                               | 0    | 0     | 0   |  | 0         | 0    | 0     | 0   |  | 0                                              | 0    | 0     | 0   |  |
| 12:00 PM                            | 0    | 0    | 0     | 0   | 0                               | 0    | 0     | 0   |  | 0         | 0    | 0     | 0   |  | 0                                              | 0    | 0     | 0   |  |
| 12:15 PM                            | 0    | 0    | 0     | 0   | 0                               | 1    | 0     | 0   |  | 0         | 0    | 0     | 0   |  | 0                                              | 0    | 0     | 0   |  |
| 12:30 PM                            | 0    | 0    | 0     | 0   | 0                               | 2    | 0     | 0   |  | 0         | 0    | 0     | 0   |  | 0                                              | 0    | 0     | 1   |  |
| 12:45 PM                            | 0    | 0    | 0     | 0   | 0                               | 1    | 0     | 0   |  | 0         | 0    | 0     | 0   |  | 0                                              | 0    | 0     | 0   |  |
| 1:00 PM                             | 0    | 0    | 0     | 0   | 0                               | 0    | 0     | 0   |  | 0         | 0    | 0     | 0   |  | 0                                              | 0    | 0     | 0   |  |
| 1:15 AM                             | 0    | 1    | 0     | 0   | 0                               | 0    | 0     | 0   |  | 0         | 0    | 0     | 0   |  | 0                                              | 0    | 0     | 2   |  |
| 1:30 AM                             | 0    | 1    | 0     | 0   | 0                               | 0    | 0     | 0   |  | 0         | 0    | 0     | 0   |  | 0                                              | 0    | 0     | 2   |  |
| 1:45 AM                             | 0    | 3    | 0     | 0   | 0                               | 0    | 0     | 0   |  | 0         | 0    | 0     | 0   |  | 0                                              | 0    | 0     | 0   |  |

| SAT PEAK HOUR<br>1:00 PM<br>to<br>2:00 PM | Winchester Street<br>Northwestbound |      |       |     |  | Centre Street<br>Southwestbound |      |       |     |  | Eastbound |      |       |     |  | Route 9 EB Ramp (Boylston Street)<br>Westbound |      |       |     |  |
|-------------------------------------------|-------------------------------------|------|-------|-----|--|---------------------------------|------|-------|-----|--|-----------|------|-------|-----|--|------------------------------------------------|------|-------|-----|--|
|                                           | Left                                | Thru | Right | PED |  | Left                            | Thru | Right | PED |  | Left      | Thru | Right | PED |  | Left                                           | Thru | Right | PED |  |
|                                           | 0                                   | 5    | 0     | 0   |  | 0                               | 0    | 0     | 0   |  | 0         | 0    | 0     | 0   |  | 0                                              | 0    | 0     | 4   |  |

<sup>1</sup> Peak hours corresponds to vehicular peak hours.

Client: Matt Duranleau  
Project #: 12239.00\_127\_018\_VHB  
BTD #: Location 25  
Location: Newton, MA  
Street 1: Centre Street  
Street 2: Route 9 WB Ramp (Boylston Street)  
Count Date: 10/26/2017  
Day of Week: Saturday  
Weather: Sun w/ Clouds, 65°F



TOTAL (CARS & TRUCKS)

| Centre Street<br>Northeastbound |        |      |      |       | Centre Street<br>Southwestbound |      |      |       |  | Route 9 WB On-Ramp (Boylston Street)<br>Eastbound |      |      |       |  | Route 9 WB Off-Ramp (Boylston Street)<br>Westbound |      |      |       |  |
|---------------------------------|--------|------|------|-------|---------------------------------|------|------|-------|--|---------------------------------------------------|------|------|-------|--|----------------------------------------------------|------|------|-------|--|
| Start Time                      | U-Turn | Left | Thru | Right | U-Turn                          | Left | Thru | Right |  | U-Turn                                            | Left | Thru | Right |  | U-Turn                                             | Left | Thru | Right |  |
| 11:00 AM                        | 0      | 35   | 219  | 0     | 0                               | 0    | 134  | 26    |  | 0                                                 | 0    | 0    | 8     |  | 0                                                  | 37   | 3    | 3     |  |
| 11:15 AM                        | 0      | 38   | 168  | 0     | 0                               | 0    | 124  | 28    |  | 0                                                 | 0    | 0    | 10    |  | 0                                                  | 39   | 4    | 3     |  |
| 11:30 AM                        | 0      | 37   | 176  | 0     | 0                               | 0    | 131  | 30    |  | 0                                                 | 0    | 0    | 9     |  | 0                                                  | 37   | 6    | 4     |  |
| 11:45 AM                        | 0      | 40   | 132  | 0     | 0                               | 0    | 124  | 31    |  | 0                                                 | 1    | 0    | 11    |  | 0                                                  | 38   | 5    | 3     |  |
| 12:00 PM                        | 0      | 39   | 146  | 0     | 0                               | 0    | 111  | 33    |  | 0                                                 | 0    | 0    | 8     |  | 0                                                  | 39   | 4    | 3     |  |
| 12:15 PM                        | 0      | 42   | 157  | 0     | 0                               | 0    | 139  | 34    |  | 0                                                 | 0    | 0    | 9     |  | 0                                                  | 36   | 6    | 2     |  |
| 12:30 PM                        | 0      | 44   | 158  | 0     | 0                               | 0    | 138  | 32    |  | 0                                                 | 0    | 0    | 9     |  | 0                                                  | 37   | 5    | 3     |  |
| 12:45 PM                        | 0      | 47   | 154  | 0     | 0                               | 0    | 129  | 29    |  | 0                                                 | 0    | 0    | 10    |  | 0                                                  | 35   | 4    | 3     |  |
| 1:00 PM                         | 0      | 48   | 188  | 0     | 0                               | 0    | 173  | 28    |  | 0                                                 | 1    | 0    | 11    |  | 0                                                  | 38   | 3    | 5     |  |
| 1:15 AM                         | 0      | 47   | 170  | 0     | 0                               | 0    | 147  | 25    |  | 0                                                 | 0    | 0    | 12    |  | 0                                                  | 36   | 2    | 6     |  |
| 1:30 AM                         | 0      | 46   | 182  | 0     | 0                               | 0    | 152  | 24    |  | 0                                                 | 0    | 0    | 10    |  | 0                                                  | 37   | 4    | 4     |  |
| 1:45 AM                         | 0      | 43   | 197  | 0     | 0                               | 0    | 142  | 23    |  | 0                                                 | 0    | 0    | 9     |  | 0                                                  | 34   | 3    | 5     |  |

| SAT PEAK HOUR<br>1:00 PM<br>to<br>2:00 PM | Centre Street<br>Northeastbound |      |      |       |  | Centre Street<br>Southwestbound |      |      |       |  | Route 9 WB On-Ramp (Boylston Street)<br>Eastbound |      |      |       |  | Route 9 WB Off-Ramp (Boylston Street)<br>Westbound |      |      |       |  |
|-------------------------------------------|---------------------------------|------|------|-------|--|---------------------------------|------|------|-------|--|---------------------------------------------------|------|------|-------|--|----------------------------------------------------|------|------|-------|--|
|                                           | U-Turn                          | Left | Thru | Right |  | U-Turn                          | Left | Thru | Right |  | U-Turn                                            | Left | Thru | Right |  | U-Turn                                             | Left | Thru | Right |  |
|                                           | 0                               | 184  | 737  | 0     |  | 0                               | 0    | 614  | 100   |  | 0                                                 | 1    | 0    | 42    |  | 0                                                  | 145  | 12   | 20    |  |
| PHF                                       |                                 | 0.96 |      |       |  |                                 | 0.89 |      |       |  |                                                   | 0.90 |      |       |  |                                                    | 0.96 |      |       |  |
| PH %                                      | 0.0%                            | 0.0% | 0.5% | 0.0%  |  | 0.0%                            | 0.0% | 0.3% | 0.0%  |  | 0.0%                                              | 0.0% | 0.0% | 0.0%  |  | 0.0%                                               | 0.7% | 0.0% | 0.6%  |  |

Client: Matt Duranleau  
Project #: 12239.00\_127\_018\_VHB  
BTD #: Location 25  
Location: Newton, MA  
Street 1: Centre Street  
Street 2: Route 9 WB Ramp (Boylston Street)  
Count Date: 10/28/2017  
Day of Week: Saturday  
Weather: Sun w/ Clouds, 65°F



TRUCKS

| Start Time | Centre Street Northeastbound |      |      |       | Centre Street Southwestbound |      |      |       | Route 9 WB On-Ramp (Boylston Street) Eastbound |      |      |       | Route 9 WB Off-Ramp (Boylston Street) Westbound |      |      |       |
|------------|------------------------------|------|------|-------|------------------------------|------|------|-------|------------------------------------------------|------|------|-------|-------------------------------------------------|------|------|-------|
|            | U-Turn                       | Left | Thru | Right | U-Turn                       | Left | Thru | Right | U-Turn                                         | Left | Thru | Right | U-Turn                                          | Left | Thru | Right |
| 11:00 AM   | 0                            | 0    | 1    | 0     | 0                            | 0    | 0    | 0     | 0                                              | 0    | 0    | 0     | 0                                               | 0    | 0    | 0     |
| 11:15 AM   | 0                            | 0    | 1    | 0     | 0                            | 0    | 1    | 0     | 0                                              | 0    | 0    | 0     | 0                                               | 0    | 0    | 0     |
| 11:30 AM   | 0                            | 0    | 2    | 0     | 0                            | 0    | 2    | 0     | 0                                              | 0    | 0    | 0     | 0                                               | 0    | 0    | 0     |
| 11:45 AM   | 0                            | 0    | 2    | 0     | 0                            | 0    | 1    | 0     | 0                                              | 0    | 0    | 0     | 0                                               | 1    | 0    | 0     |
| 12:00 PM   | 0                            | 0    | 1    | 0     | 0                            | 0    | 2    | 0     | 0                                              | 0    | 0    | 0     | 0                                               | 1    | 0    | 0     |
| 12:15 PM   | 0                            | 0    | 0    | 0     | 0                            | 0    | 1    | 0     | 0                                              | 0    | 0    | 0     | 0                                               | 0    | 0    | 0     |
| 12:30 PM   | 0                            | 0    | 1    | 0     | 0                            | 0    | 1    | 0     | 0                                              | 0    | 0    | 0     | 0                                               | 0    | 0    | 0     |
| 12:45 PM   | 0                            | 0    | 0    | 0     | 0                            | 0    | 0    | 0     | 0                                              | 0    | 0    | 0     | 0                                               | 0    | 0    | 0     |
| 1:00 PM    | 0                            | 0    | 2    | 0     | 0                            | 0    | 1    | 0     | 0                                              | 0    | 0    | 0     | 0                                               | 0    | 0    | 0     |
| 1:15 AM    | 0                            | 0    | 1    | 0     | 0                            | 0    | 0    | 0     | 0                                              | 0    | 0    | 0     | 0                                               | 1    | 0    | 0     |
| 1:30 AM    | 0                            | 0    | 1    | 0     | 0                            | 0    | 1    | 0     | 0                                              | 0    | 0    | 0     | 0                                               | 0    | 0    | 0     |
| 1:45 AM    | 0                            | 0    | 0    | 0     | 0                            | 0    | 0    | 0     | 0                                              | 0    | 0    | 0     | 0                                               | 0    | 0    | 0     |

| SAT PEAK HOUR<br>11:15 AM<br>to<br>12:15 PM | Centre Street Northeastbound |      |      |       | Centre Street Southwestbound |      |      |       | Route 9 WB On-Ramp (Boylston Street) Eastbound |      |      |       | Route 9 WB Off-Ramp (Boylston Street) Westbound |      |      |       |
|---------------------------------------------|------------------------------|------|------|-------|------------------------------|------|------|-------|------------------------------------------------|------|------|-------|-------------------------------------------------|------|------|-------|
|                                             | U-Turn                       | Left | Thru | Right | U-Turn                       | Left | Thru | Right | U-Turn                                         | Left | Thru | Right | U-Turn                                          | Left | Thru | Right |
| PHF                                         | 0                            | 0    | 6    | 0     | 0                            | 0    | 6    | 0     | 0                                              | 0    | 0    | 0     | 0                                               | 2    | 0    | 0     |
|                                             | 0.75                         |      |      |       | 0.75                         |      |      |       | 0.00                                           |      |      |       | 0.50                                            |      |      |       |

Client: Matt Duranleau  
Project #: 12239.00\_127\_018\_VHB  
BTD #: Location 25  
Location: Newton, MA  
Street 1: Centre Street  
Street 2: Route 9 WB Ramp (Boylston Street)  
Count Date: 10/28/2017  
Day of Week: Saturday  
Weather: Sun w/ Clouds, 65°F



PEDESTRIANS & BICYCLES

| Start Time | Centre Street Northeastbound |      |       |     | Centre Street Southwestbound |      |       |     | Route 9 WB On-Ramp (Boylston Street) Eastbound |      |       |     | Route 9 WB Off-Ramp (Boylston Street) Westbound |      |       |     |
|------------|------------------------------|------|-------|-----|------------------------------|------|-------|-----|------------------------------------------------|------|-------|-----|-------------------------------------------------|------|-------|-----|
|            | Left                         | Thru | Right | PED | Left                         | Thru | Right | PED | Left                                           | Thru | Right | PED | Left                                            | Thru | Right | PED |
| 11:00 AM   | 0                            | 0    | 0     | 0   | 0                            | 1    | 0     | 0   | 0                                              | 0    | 0     | 12  | 0                                               | 0    | 0     | 1   |
| 11:15 AM   | 0                            | 0    | 0     | 0   | 0                            | 1    | 0     | 0   | 0                                              | 0    | 0     | 5   | 0                                               | 0    | 0     | 1   |
| 11:30 AM   | 1                            | 0    | 0     | 0   | 0                            | 0    | 0     | 0   | 0                                              | 0    | 0     | 3   | 0                                               | 0    | 0     | 2   |
| 11:45 AM   | 0                            | 1    | 0     | 0   | 0                            | 0    | 0     | 0   | 0                                              | 0    | 0     | 4   | 0                                               | 0    | 0     | 0   |
| 12:00 PM   | 0                            | 0    | 0     | 0   | 0                            | 0    | 0     | 0   | 0                                              | 0    | 0     | 2   | 0                                               | 0    | 0     | 0   |
| 12:15 PM   | 0                            | 0    | 0     | 0   | 0                            | 1    | 0     | 0   | 0                                              | 0    | 0     | 3   | 0                                               | 0    | 0     | 1   |
| 12:30 PM   | 0                            | 0    | 0     | 2   | 0                            | 2    | 0     | 0   | 0                                              | 0    | 0     | 2   | 0                                               | 0    | 0     | 0   |
| 12:45 PM   | 0                            | 0    | 0     | 0   | 0                            | 1    | 0     | 0   | 0                                              | 0    | 0     | 3   | 0                                               | 0    | 0     | 0   |
| 1:00 PM    | 0                            | 0    | 0     | 0   | 0                            | 0    | 0     | 0   | 0                                              | 0    | 0     | 5   | 0                                               | 0    | 0     | 1   |
| 1:15 AM    | 0                            | 1    | 0     | 0   | 0                            | 0    | 0     | 0   | 0                                              | 0    | 0     | 2   | 0                                               | 0    | 0     | 1   |
| 1:30 AM    | 0                            | 1    | 0     | 0   | 0                            | 0    | 0     | 0   | 0                                              | 0    | 0     | 1   | 0                                               | 0    | 0     | 2   |
| 1:45 AM    | 0                            | 3    | 0     | 0   | 0                            | 0    | 0     | 0   | 0                                              | 0    | 0     | 2   | 0                                               | 0    | 0     | 0   |

| SAT PEAK HOUR <sup>1</sup><br>1:00 PM<br>to<br>2:00 PM | Centre Street Northeastbound |      |       |     | Centre Street Southwestbound |      |       |     | Route 9 WB On-Ramp (Boylston Street) Eastbound |      |       |     | Route 9 WB Off-Ramp (Boylston Street) Westbound |      |       |     |
|--------------------------------------------------------|------------------------------|------|-------|-----|------------------------------|------|-------|-----|------------------------------------------------|------|-------|-----|-------------------------------------------------|------|-------|-----|
|                                                        | Left                         | Thru | Right | PED | Left                         | Thru | Right | PED | Left                                           | Thru | Right | PED | Left                                            | Thru | Right | PED |
|                                                        | 0                            | 5    | 0     | 0   | 0                            | 0    | 0     | 0   | 0                                              | 0    | 0     | 10  | 0                                               | 0    | 0     | 4   |

<sup>1</sup> Peak hours corresponds to vehicular peak hours.

Client: Matt Duranleau  
Project #: 12239.00\_127\_018\_VHB  
BTD #: Location 26  
Location: Needham, MA  
Street 1: Highland Avenue  
Street 2: 2nd Avenue  
Count Date: 10/28/2017  
Day of Week: Saturday  
Weather: Sun w/ Clouds, 65°F



**TOTAL (CARS & TRUCKS)**

| Start Time | Highland Avenue Northeastbound |      |      |       | Highland Avenue Southwestbound |      |      |       | 2nd Avenue Northwestbound |      |      |       | Shopping Driveway Southeastbound |      |      |       |
|------------|--------------------------------|------|------|-------|--------------------------------|------|------|-------|---------------------------|------|------|-------|----------------------------------|------|------|-------|
|            | U-Turn                         | Left | Thru | Right | U-Turn                         | Left | Thru | Right | U-Turn                    | Left | Thru | Right | U-Turn                           | Left | Thru | Right |
| 11:00 AM   | 0                              | 2    | 114  | 15    | 0                              | 25   | 183  | 12    | 0                         | 43   | 4    | 27    | 0                                | 14   | 3    | 2     |
| 11:15 AM   | 0                              | 3    | 123  | 17    | 0                              | 27   | 187  | 14    | 0                         | 47   | 5    | 29    | 0                                | 15   | 3    | 3     |
| 11:30 AM   | 0                              | 2    | 127  | 18    | 0                              | 29   | 190  | 13    | 0                         | 48   | 3    | 31    | 0                                | 14   | 2    | 3     |
| 11:45 AM   | 0                              | 3    | 132  | 20    | 0                              | 30   | 193  | 11    | 0                         | 48   | 4    | 28    | 0                                | 16   | 3    | 4     |
| 12:00 PM   | 0                              | 3    | 134  | 21    | 0                              | 33   | 191  | 10    | 0                         | 51   | 5    | 29    | 0                                | 15   | 2    | 2     |
| 12:15 PM   | 0                              | 4    | 135  | 24    | 0                              | 32   | 195  | 9     | 0                         | 52   | 3    | 27    | 0                                | 17   | 4    | 3     |
| 12:30 PM   | 0                              | 3    | 131  | 26    | 0                              | 30   | 192  | 11    | 0                         | 62   | 4    | 31    | 0                                | 16   | 3    | 3     |
| 12:45 PM   | 0                              | 4    | 129  | 29    | 0                              | 27   | 182  | 10    | 0                         | 69   | 4    | 34    | 0                                | 17   | 3    | 4     |
| 1:00 PM    | 0                              | 3    | 127  | 30    | 0                              | 26   | 176  | 11    | 0                         | 78   | 5    | 41    | 0                                | 18   | 2    | 3     |
| 1:15 AM    | 0                              | 3    | 128  | 29    | 0                              | 23   | 163  | 12    | 0                         | 84   | 3    | 46    | 0                                | 16   | 3    | 4     |
| 1:30 AM    | 0                              | 2    | 124  | 27    | 0                              | 24   | 167  | 10    | 0                         | 83   | 4    | 45    | 0                                | 17   | 2    | 2     |
| 1:45 AM    | 0                              | 3    | 121  | 25    | 0                              | 22   | 165  | 11    | 0                         | 81   | 3    | 42    | 0                                | 15   | 3    | 2     |

| SAT PEAK HOUR             |             | Highland Avenue<br>Northeastbound |      |      |       | Highland Avenue<br>Southwestbound |      |      |       | 2nd Avenue<br>Northwestbound |      |      |       | Shopping Driveway<br>Southeastbound |      |      |       |
|---------------------------|-------------|-----------------------------------|------|------|-------|-----------------------------------|------|------|-------|------------------------------|------|------|-------|-------------------------------------|------|------|-------|
| 12:30 PM<br>to<br>1:30 AM | PHF<br>HV % | U-Turn                            | Left | Thru | Right | U-Turn                            | Left | Thru | Right | U-Turn                       | Left | Thru | Right | U-Turn                              | Left | Thru | Right |
|                           |             | 0                                 | 13   | 515  | 114   | 0                                 | 106  | 713  | 44    | 0                            | 293  | 16   | 152   | 0                                   | 67   | 11   | 14    |
|                           |             | 0.99                              |      |      |       | 0.93                              |      |      |       | 0.87                         |      |      |       | 0.96                                |      |      |       |
|                           |             | 0.0%                              | 0.0% | 0.6% | 0.0%  | 0.0%                              | 0.0% | 0.3% | 0.0%  | 0.0%                         | 1.4% | 0.0% | 0.0%  | 0.0%                                | 0.0% | 0.0% | 0.0%  |

11/10/2017, 6:24 PM, 12239.00\_127\_018\_TMC\_Loc 26 (Saturday)

Client: Matt Duranleau  
Project #: 12239.00\_127\_018\_VHB  
BTD #: Location 26  
Location: Needham, MA  
Street 1: Highland Avenue  
Street 2: 2nd Avenue  
Count Date: 10/28/2017  
Day of Week: Saturday  
Weather: Sun w/ Clouds, 65°F



**TRUCKS**

| Start Time | Highland Avenue Northeastbound |      |      |       | Highland Avenue Southwestbound |      |      |       | 2nd Avenue Northwestbound |      |      |       | Shopping Driveway Southeastbound |      |      |       |
|------------|--------------------------------|------|------|-------|--------------------------------|------|------|-------|---------------------------|------|------|-------|----------------------------------|------|------|-------|
|            | U-Turn                         | Left | Thru | Right | U-Turn                         | Left | Thru | Right | U-Turn                    | Left | Thru | Right | U-Turn                           | Left | Thru | Right |
| 11:00 AM   | 0                              | 0    | 0    | 0     | 0                              | 0    | 0    | 0     | 0                         | 0    | 0    | 0     | 0                                | 1    | 0    | 0     |
| 11:15 AM   | 0                              | 0    | 0    | 0     | 0                              | 0    | 2    | 0     | 0                         | 3    | 0    | 0     | 0                                | 0    | 0    | 0     |
| 11:30 AM   | 0                              | 0    | 1    | 0     | 0                              | 0    | 0    | 0     | 0                         | 1    | 0    | 0     | 0                                | 0    | 0    | 0     |
| 11:45 AM   | 0                              | 0    | 0    | 0     | 0                              | 1    | 0    | 0     | 0                         | 1    | 0    | 0     | 0                                | 0    | 0    | 0     |
| 12:00 PM   | 0                              | 0    | 0    | 0     | 0                              | 0    | 0    | 0     | 0                         | 2    | 0    | 0     | 0                                | 0    | 0    | 0     |
| 12:15 PM   | 0                              | 0    | 0    | 1     | 0                              | 0    | 0    | 0     | 0                         | 1    | 0    | 1     | 0                                | 0    | 0    | 0     |
| 12:30 PM   | 0                              | 0    | 2    | 0     | 0                              | 1    | 0    | 0     | 0                         | 1    | 0    | 0     | 0                                | 0    | 0    | 0     |
| 12:45 PM   | 0                              | 0    | 0    | 0     | 0                              | 1    | 0    | 0     | 0                         | 2    | 0    | 0     | 0                                | 0    | 0    | 0     |
| 1:00 PM    | 0                              | 0    | 1    | 0     | 0                              | 0    | 0    | 0     | 0                         | 0    | 0    | 0     | 0                                | 0    | 0    | 0     |
| 1:15 AM    | 0                              | 0    | 0    | 0     | 0                              | 0    | 0    | 0     | 0                         | 1    | 0    | 0     | 0                                | 0    | 0    | 0     |
| 1:30 AM    | 0                              | 0    | 0    | 0     | 0                              | 2    | 0    | 0     | 0                         | 0    | 0    | 0     | 0                                | 0    | 0    | 0     |
| 1:45 AM    | 0                              | 0    | 0    | 0     | 0                              | 0    | 0    | 0     | 0                         | 1    | 0    | 0     | 0                                | 0    | 0    | 0     |

| SAT PEAK HOUR<br>12:00 PM<br>to<br>1:00 PM<br><br>PHF |  | Highland Avenue<br>Northeastbound |      |      |       | Highland Avenue<br>Southwestbound |      |      |       | 2nd Avenue<br>Northwestbound |      |      |       | Shopping Driveway<br>Southeastbound |      |      |       |
|-------------------------------------------------------|--|-----------------------------------|------|------|-------|-----------------------------------|------|------|-------|------------------------------|------|------|-------|-------------------------------------|------|------|-------|
|                                                       |  | U-Turn                            | Left | Thru | Right | U-Turn                            | Left | Thru | Right | U-Turn                       | Left | Thru | Right | U-Turn                              | Left | Thru | Right |
|                                                       |  | 0                                 | 0    | 2    | 1     | 0                                 | 0    | 2    | 0     | 0                            | 6    | 0    | 1     | 0                                   | 0    | 0    | 0     |
|                                                       |  | 0.38                              |      |      |       | 0.50                              |      |      |       | 0.88                         |      |      |       | 0.00                                |      |      |       |

11/10/2017, 6:24 PM, 12239.00\_127\_018\_TMC\_Loc 26 (Saturday)

Client: Matt Duranleau  
Project #: 12239.00\_127\_018\_VHB  
BTD #: Location 26  
Location: Needham, MA  
Street 1: Highland Avenue  
Street 2: 2nd Avenue  
Count Date: 10/26/2017  
Day of Week: Saturday  
Weather: Sun w/ Clouds, 65°F



PEDESTRIANS & BICYCLES

| Highland Avenue Northeastbound |      |      |       |     | Highland Avenue Southwestbound |      |       |     |  | 2nd Avenue Northwestbound |      |       |     |  | Shopping Driveway Southeastbound |      |       |     |  |
|--------------------------------|------|------|-------|-----|--------------------------------|------|-------|-----|--|---------------------------|------|-------|-----|--|----------------------------------|------|-------|-----|--|
| Start Time                     | Left | Thru | Right | PED | Left                           | Thru | Right | PED |  | Left                      | Thru | Right | PED |  | Left                             | Thru | Right | PED |  |
| 11:00 AM                       | 0    | 0    | 0     | 0   | 0                              | 1    | 0     | 0   |  | 0                         | 0    | 0     | 1   |  | 1                                | 0    | 0     | 0   |  |
| 11:15 AM                       | 0    | 0    | 0     | 0   | 0                              | 0    | 0     | 1   |  | 0                         | 0    | 0     | 1   |  | 0                                | 0    | 0     | 0   |  |
| 11:30 AM                       | 0    | 1    | 0     | 0   | 0                              | 0    | 0     | 0   |  | 0                         | 0    | 0     | 0   |  | 0                                | 0    | 0     | 1   |  |
| 11:45 AM                       | 0    | 0    | 0     | 0   | 0                              | 1    | 0     | 2   |  | 0                         | 0    | 0     | 2   |  | 0                                | 0    | 0     | 0   |  |
| 12:00 PM                       | 0    | 0    | 0     | 0   | 0                              | 0    | 0     | 0   |  | 0                         | 0    | 0     | 2   |  | 0                                | 0    | 0     | 1   |  |
| 12:15 PM                       | 0    | 0    | 0     | 0   | 0                              | 0    | 0     | 0   |  | 0                         | 0    | 0     | 0   |  | 0                                | 0    | 0     | 2   |  |
| 12:30 PM                       | 0    | 1    | 0     | 0   | 0                              | 0    | 0     | 1   |  | 0                         | 0    | 0     | 1   |  | 0                                | 0    | 0     | 0   |  |
| 12:45 PM                       | 0    | 0    | 0     | 0   | 0                              | 1    | 0     | 0   |  | 0                         | 0    | 0     | 0   |  | 0                                | 0    | 0     | 0   |  |
| 1:00 PM                        | 0    | 0    | 0     | 0   | 0                              | 0    | 0     | 1   |  | 0                         | 0    | 0     | 2   |  | 0                                | 1    | 0     | 1   |  |
| 1:15 AM                        | 0    | 1    | 0     | 0   | 0                              | 0    | 0     | 4   |  | 0                         | 0    | 0     | 3   |  | 0                                | 0    | 0     | 1   |  |
| 1:30 AM                        | 0    | 0    | 0     | 0   | 0                              | 0    | 0     | 0   |  | 0                         | 0    | 0     | 0   |  | 0                                | 0    | 0     | 1   |  |
| 1:45 AM                        | 0    | 0    | 0     | 0   | 0                              | 1    | 0     | 0   |  | 0                         | 0    | 0     | 1   |  | 0                                | 0    | 0     | 0   |  |

| Highland Avenue Northeastbound |      |      |       |     | Highland Avenue Southwestbound |      |       |     |  | 2nd Avenue Northwestbound |      |       |     |  | Shopping Driveway Southeastbound |      |       |     |  |
|--------------------------------|------|------|-------|-----|--------------------------------|------|-------|-----|--|---------------------------|------|-------|-----|--|----------------------------------|------|-------|-----|--|
| Start Time                     | Left | Thru | Right | PED | Left                           | Thru | Right | PED |  | Left                      | Thru | Right | PED |  | Left                             | Thru | Right | PED |  |
| 12:30 PM to 1:30 AM            | 0    | 2    | 0     | 0   | 0                              | 1    | 0     | 0   |  | 0                         | 0    | 0     | 0   |  | 0                                | 1    | 0     | 2   |  |

<sup>1</sup> Peak hours corresponds to vehicular peak hours.

Client: Matt Duranleau  
Project #: 12239.00\_127\_018\_VHB  
BTD #: Location 27  
Location: Needham, MA  
Street 1: Highland Avenue  
Street 2: 1st Avenue  
Count Date: 10/26/2017  
Day of Week: Saturday  
Weather: Sun w/ Clouds, 65°F



TOTAL (CARS & TRUCKS)

| Highland Avenue<br>Northeastbound |        |      |      |       | Highland Avenue<br>Southwestbound |      |      |       |        | 1st Avenue<br>Northwestbound |      |       |        |      | Southeastbound |       |  |  |  |
|-----------------------------------|--------|------|------|-------|-----------------------------------|------|------|-------|--------|------------------------------|------|-------|--------|------|----------------|-------|--|--|--|
| Start Time                        | U-Turn | Left | Thru | Right | U-Turn                            | Left | Thru | Right | U-Turn | Left                         | Thru | Right | U-Turn | Left | Thru           | Right |  |  |  |
| 11:00 AM                          | 0      | 0    | 137  | 25    | 0                                 | 0    | 276  | 0     | 0      | 0                            | 0    | 22    | 0      | 0    | 0              | 0     |  |  |  |
| 11:15 AM                          | 0      | 0    | 145  | 23    | 0                                 | 0    | 284  | 0     | 0      | 0                            | 0    | 24    | 0      | 0    | 0              | 0     |  |  |  |
| 11:30 AM                          | 0      | 0    | 147  | 24    | 0                                 | 0    | 291  | 0     | 0      | 0                            | 0    | 25    | 0      | 0    | 0              | 0     |  |  |  |
| 11:45 AM                          | 0      | 0    | 152  | 23    | 0                                 | 0    | 302  | 0     | 0      | 0                            | 0    | 28    | 0      | 0    | 0              | 0     |  |  |  |
| 12:00 PM                          | 0      | 0    | 151  | 22    | 0                                 | 0    | 305  | 0     | 0      | 0                            | 0    | 29    | 0      | 0    | 0              | 0     |  |  |  |
| 12:15 PM                          | 0      | 0    | 156  | 24    | 0                                 | 0    | 307  | 0     | 0      | 0                            | 0    | 27    | 0      | 0    | 0              | 0     |  |  |  |
| 12:30 PM                          | 0      | 0    | 153  | 21    | 0                                 | 0    | 306  | 0     | 0      | 0                            | 0    | 24    | 0      | 0    | 0              | 0     |  |  |  |
| 12:45 PM                          | 0      | 0    | 154  | 20    | 0                                 | 0    | 298  | 0     | 0      | 0                            | 0    | 22    | 0      | 0    | 0              | 0     |  |  |  |
| 1:00 PM                           | 0      | 0    | 151  | 19    | 0                                 | 0    | 295  | 0     | 0      | 0                            | 0    | 20    | 0      | 0    | 0              | 0     |  |  |  |
| 1:15 AM                           | 0      | 0    | 150  | 21    | 0                                 | 0    | 291  | 0     | 0      | 0                            | 0    | 23    | 0      | 0    | 0              | 0     |  |  |  |
| 1:30 AM                           | 0      | 0    | 143  | 20    | 0                                 | 0    | 293  | 0     | 0      | 0                            | 0    | 21    | 0      | 0    | 0              | 0     |  |  |  |
| 1:45 AM                           | 0      | 0    | 139  | 18    | 0                                 | 0    | 287  | 0     | 0      | 0                            | 0    | 19    | 0      | 0    | 0              | 0     |  |  |  |

| Highland Avenue Northeastbound |      |      |       |        | Highland Avenue Southwestbound |      |       |        |      | 1st Avenue Northwestbound |       |        |      |      | Southeastbound |        |      |      |       |
|--------------------------------|------|------|-------|--------|--------------------------------|------|-------|--------|------|---------------------------|-------|--------|------|------|----------------|--------|------|------|-------|
| U-Turn                         | Left | Thru | Right | U-Turn | Left                           | Thru | Right | U-Turn | Left | Thru                      | Right | U-Turn | Left | Thru | Right          | U-Turn | Left | Thru | Right |
| 11:45 AM to 12:45 PM           | 0    | 612  | 90    | 0      | 0                              | 1220 | 0     | 0      | 0    | 0                         | 108   | 0      | 0    | 0    | 0              | 0      | 0    | 0    | 0     |
| PHF                            | 0.98 |      |       |        | 0.99                           |      |       |        | 0.93 |                           |       |        |      |      | 0.00           |        |      |      |       |
| PH %                           | 0.0% | 0.0% | 0.5%  | 0.0%   | 0.0%                           | 0.0% | 0.6%  | 0.0%   | 0.0% | 0.0%                      | 0.0%  | 0.0%   | 0.0% | 0.0% | 0.0%           | 0.0%   | 0.0% | 0.0% | 0.0%  |

\*Note:  
1. There were punch of orange traffic drums placed along the centerline from median to median of Highland Avenue at this intersection.  
No Vehicles were allowed to make Highland Avenue Southwestbound Left Turn.  
No Vehicles were allowed to make 1st Avenue Northwestbound Left Turn.



Client: Matt Duranleau  
Project #: 12239.00\_127\_018\_VHB  
BTD #: Location 27  
Location: Needham, MA  
Street 1: Highland Avenue  
Street 2: 1st Avenue  
Count Date: 10/28/2017  
Day of Week: Saturday  
Weather: Sun w/ Clouds, 65°F



TRUCKS

| Start Time           | Highland Avenue Northeastbound |      |      |       | Highland Avenue Southwestbound |      |      |       | 1st Avenue Northwestbound |      |      |       | 1st Avenue Southeastbound |      |      |       |
|----------------------|--------------------------------|------|------|-------|--------------------------------|------|------|-------|---------------------------|------|------|-------|---------------------------|------|------|-------|
|                      | U-Turn                         | Left | Thru | Right | U-Turn                         | Left | Thru | Right | U-Turn                    | Left | Thru | Right | U-Turn                    | Left | Thru | Right |
| 11:00 AM             | 0                              | 0    | 0    | 0     | 0                              | 2    | 0    | 0     | 0                         | 0    | 0    | 0     | 0                         | 0    | 0    | 0     |
| 11:15 AM             | 0                              | 0    | 0    | 0     | 0                              | 2    | 0    | 0     | 0                         | 0    | 0    | 0     | 0                         | 0    | 0    | 0     |
| 11:30 AM             | 0                              | 0    | 1    | 0     | 0                              | 3    | 0    | 0     | 0                         | 0    | 0    | 0     | 0                         | 0    | 0    | 0     |
| 11:45 AM             | 0                              | 0    | 0    | 0     | 0                              | 2    | 0    | 0     | 0                         | 0    | 0    | 0     | 0                         | 0    | 0    | 0     |
| 12:00 PM             | 0                              | 0    | 2    | 0     | 0                              | 2    | 0    | 0     | 0                         | 0    | 0    | 0     | 0                         | 0    | 0    | 0     |
| 12:15 PM             | 0                              | 0    | 0    | 0     | 0                              | 1    | 0    | 0     | 0                         | 0    | 0    | 0     | 0                         | 0    | 0    | 0     |
| 12:30 PM             | 0                              | 0    | 1    | 0     | 0                              | 2    | 0    | 0     | 0                         | 0    | 0    | 0     | 0                         | 0    | 0    | 0     |
| 12:45 PM             | 0                              | 0    | 0    | 0     | 0                              | 1    | 0    | 0     | 0                         | 0    | 0    | 0     | 0                         | 0    | 0    | 0     |
| 1:00 PM              | 0                              | 0    | 1    | 1     | 0                              | 2    | 0    | 0     | 0                         | 0    | 0    | 0     | 0                         | 0    | 0    | 0     |
| 1:15 AM              | 0                              | 0    | 0    | 0     | 0                              | 1    | 0    | 0     | 0                         | 0    | 0    | 0     | 0                         | 0    | 0    | 0     |
| 1:30 AM              | 0                              | 0    | 0    | 0     | 0                              | 1    | 0    | 0     | 0                         | 0    | 0    | 0     | 0                         | 0    | 0    | 0     |
| 1:45 AM              | 0                              | 0    | 1    | 1     | 0                              | 2    | 0    | 0     | 0                         | 0    | 0    | 0     | 0                         | 0    | 0    | 0     |
| SAT PEAK HOUR        |                                |      |      |       |                                |      |      |       |                           |      |      |       |                           |      |      |       |
| 11:15 AM to 12:15 PM |                                |      |      |       |                                |      |      |       |                           |      |      |       |                           |      |      |       |
| PHF                  |                                |      |      |       |                                |      |      |       |                           |      |      |       |                           |      |      |       |
| 0.38                 |                                |      |      | 0.75  |                                |      |      | 0.00  |                           |      |      | 0.00  |                           |      |      | 0     |

Client: Matt Duranleau  
Project #: 12239.00\_127\_018\_VHB  
BTD #: Location 27  
Location: Needham, MA  
Street 1: Highland Avenue  
Street 2: 1st Avenue  
Count Date: 10/28/2017  
Day of Week: Saturday  
Weather: Sun w/ Clouds, 65°F



PEDESTRIANS & BICYCLES

| Start Time           | Highland Avenue Northeastbound |      |       |     | Highland Avenue Southwestbound |      |       |     | 1st Avenue Northwestbound |      |       |     | 1st Avenue Southeastbound |      |       |     |
|----------------------|--------------------------------|------|-------|-----|--------------------------------|------|-------|-----|---------------------------|------|-------|-----|---------------------------|------|-------|-----|
|                      | Left                           | Thru | Right | PED | Left                           | Thru | Right | PED | Left                      | Thru | Right | PED | Left                      | Thru | Right | PED |
| 11:00 AM             | 0                              | 0    | 0     | 0   | 0                              | 0    | 0     | 0   | 0                         | 0    | 0     | 1   | 0                         | 0    | 0     | 0   |
| 11:15 AM             | 0                              | 0    | 0     | 0   | 0                              | 0    | 0     | 0   | 0                         | 0    | 0     | 0   | 0                         | 0    | 0     | 0   |
| 11:30 AM             | 0                              | 1    | 0     | 0   | 0                              | 0    | 0     | 0   | 0                         | 0    | 0     | 0   | 0                         | 0    | 0     | 0   |
| 11:45 AM             | 0                              | 0    | 0     | 0   | 0                              | 1    | 0     | 0   | 0                         | 0    | 0     | 0   | 0                         | 0    | 0     | 0   |
| 12:00 PM             | 0                              | 0    | 0     | 0   | 0                              | 0    | 0     | 0   | 0                         | 0    | 0     | 0   | 0                         | 0    | 0     | 0   |
| 12:15 PM             | 0                              | 0    | 0     | 0   | 0                              | 0    | 0     | 0   | 0                         | 0    | 0     | 0   | 0                         | 0    | 0     | 0   |
| 12:30 PM             | 0                              | 0    | 0     | 0   | 0                              | 0    | 0     | 0   | 0                         | 0    | 0     | 1   | 0                         | 0    | 0     | 0   |
| 12:45 PM             | 0                              | 0    | 0     | 0   | 0                              | 0    | 0     | 0   | 0                         | 0    | 0     | 0   | 0                         | 0    | 0     | 0   |
| 1:00 PM              | 0                              | 1    | 0     | 0   | 0                              | 0    | 0     | 0   | 0                         | 0    | 0     | 0   | 0                         | 0    | 0     | 0   |
| 1:15 AM              | 0                              | 0    | 0     | 0   | 0                              | 1    | 0     | 0   | 0                         | 0    | 0     | 0   | 0                         | 0    | 0     | 0   |
| 1:30 AM              | 0                              | 0    | 0     | 0   | 0                              | 0    | 0     | 0   | 0                         | 0    | 0     | 1   | 0                         | 0    | 0     | 0   |
| 1:45 AM              | 0                              | 0    | 0     | 0   | 0                              | 0    | 0     | 0   | 0                         | 0    | 0     | 0   | 0                         | 0    | 0     | 0   |
| SAT PEAK HOUR        |                                |      |       |     |                                |      |       |     |                           |      |       |     |                           |      |       |     |
| 11:45 AM to 12:45 PM |                                |      |       |     |                                |      |       |     |                           |      |       |     |                           |      |       |     |
| 0                    |                                |      |       | 0   | 0                              | 1    | 0     | 0   | 0                         | 0    | 0     | 1   | 0                         | 0    | 0     | 0   |

Peak hours corresponds to vehicular peak hours.

Client: Matthew Duranleau  
Project #: 168\_030\_VHB  
BTD #: Location 1  
Location: Needham, MA  
Street 1: Highland Avenue  
Street 2: I-95 NB On Ramp/ NB Off Ramp  
Count Date: 2/3/2018  
Day of Week: Saturday  
Weather: Mostly Sunny, 28°F



**TOTAL (CARS & TRUCKS)**

| Start Time | I-95 NB Off Ramp Northbound |      |      |       | I-95 NB On Ramp Southbound |      |      |       | Highland Avenue Eastbound |      |      |       | Highland Avenue Westbound |      |      |       |
|------------|-----------------------------|------|------|-------|----------------------------|------|------|-------|---------------------------|------|------|-------|---------------------------|------|------|-------|
|            | U-Turn                      | Left | Thru | Right | U-Turn                     | Left | Thru | Right | U-Turn                    | Left | Thru | Right | U-Turn                    | Left | Thru | Right |
| 11:00 AM   | 0                           | 0    | 0    | 39    | 0                          | 0    | 0    | 0     | 0                         | 183  | 0    | 0     | 0                         | 159  | 86   |       |
| 11:15 AM   | 0                           | 0    | 0    | 42    | 0                          | 0    | 0    | 0     | 0                         | 198  | 0    | 0     | 0                         | 163  | 88   |       |
| 11:30 AM   | 0                           | 0    | 0    | 44    | 0                          | 0    | 0    | 0     | 0                         | 201  | 0    | 0     | 0                         | 169  | 87   |       |
| 11:45 AM   | 0                           | 0    | 0    | 43    | 0                          | 0    | 0    | 0     | 0                         | 189  | 0    | 0     | 0                         | 163  | 89   |       |
| 12:00 PM   | 0                           | 0    | 0    | 41    | 0                          | 0    | 0    | 0     | 0                         | 173  | 0    | 0     | 0                         | 181  | 91   |       |
| 12:15 PM   | 0                           | 0    | 0    | 46    | 0                          | 0    | 0    | 0     | 0                         | 188  | 0    | 0     | 0                         | 202  | 94   |       |
| 12:30 PM   | 0                           | 0    | 0    | 50    | 0                          | 0    | 0    | 0     | 0                         | 197  | 0    | 0     | 0                         | 187  | 93   |       |
| 12:45 PM   | 0                           | 0    | 0    | 44    | 0                          | 0    | 0    | 0     | 0                         | 206  | 0    | 0     | 0                         | 174  | 92   |       |
| 1:00 PM    | 0                           | 0    | 0    | 36    | 0                          | 0    | 0    | 0     | 0                         | 178  | 0    | 0     | 0                         | 171  | 89   |       |
| 1:15 AM    | 0                           | 0    | 0    | 35    | 0                          | 0    | 0    | 0     | 0                         | 195  | 0    | 0     | 0                         | 161  | 91   |       |
| 1:30 AM    | 0                           | 0    | 0    | 32    | 0                          | 0    | 0    | 0     | 0                         | 218  | 0    | 0     | 0                         | 159  | 92   |       |
| 1:45 AM    | 0                           | 0    | 0    | 33    | 0                          | 0    | 0    | 0     | 0                         | 206  | 0    | 0     | 0                         | 156  | 90   |       |

| SAT PEAK HOUR<br>12:00 PM to 1:00 PM | I-95 NB Off Ramp Northbound |      |      |       | I-95 NB On Ramp Southbound |      |      |       | Highland Avenue Eastbound |      |      |       | Highland Avenue Westbound |      |      |       |
|--------------------------------------|-----------------------------|------|------|-------|----------------------------|------|------|-------|---------------------------|------|------|-------|---------------------------|------|------|-------|
|                                      | U-Turn                      | Left | Thru | Right | U-Turn                     | Left | Thru | Right | U-Turn                    | Left | Thru | Right | U-Turn                    | Left | Thru | Right |
|                                      | 0                           | 0    | 0    | 181   | 0                          | 0    | 0    | 0     | 0                         | 0    | 764  | 0     | 0                         | 0    | 744  | 370   |
| PHF                                  | 0.91                        |      |      |       | 0.00                       |      |      |       | 0.93                      |      |      |       | 0.94                      |      |      |       |
| HV %                                 | 0.0%                        | 0.0% | 0.0% | 0.6%  | 0.0%                       | 0.0% | 0.0% | 0.0%  | 0.0%                      | 0.0% | 0.7% | 0.0%  | 0.0%                      | 0.0% | 0.7% | 0.5%  |

2/4/2018, 10:31 AM, 168\_030\_TMC\_Loc 1 (Saturday)

Client: Matthew Duranleau  
Project #: 168\_030\_VHB  
BTD #: Location 1  
Location: Needham, MA  
Street 1: Highland Avenue  
Street 2: I-95 NB On Ramp/ NB Off Ramp  
Count Date: 2/3/2018  
Day of Week: Saturday  
Weather: Mostly Sunny, 28°F



**TRUCKS**

| Start Time | I-95 NB Off Ramp Northbound |      |      |       | I-95 NB On Ramp Southbound |      |      |       | Highland Avenue Eastbound |      |      |       | Highland Avenue Westbound |      |      |       |
|------------|-----------------------------|------|------|-------|----------------------------|------|------|-------|---------------------------|------|------|-------|---------------------------|------|------|-------|
|            | U-Turn                      | Left | Thru | Right | U-Turn                     | Left | Thru | Right | U-Turn                    | Left | Thru | Right | U-Turn                    | Left | Thru | Right |
| 11:00 AM   | 0                           | 0    | 0    | 1     | 0                          | 0    | 0    | 0     | 0                         | 2    | 0    | 0     | 0                         | 0    | 2    | 0     |
| 11:15 AM   | 0                           | 0    | 0    | 0     | 0                          | 0    | 0    | 0     | 0                         | 1    | 0    | 0     | 0                         | 0    | 3    | 0     |
| 11:30 AM   | 0                           | 0    | 0    | 1     | 0                          | 0    | 0    | 0     | 0                         | 2    | 0    | 0     | 0                         | 0    | 2    | 1     |
| 11:45 AM   | 0                           | 0    | 0    | 0     | 0                          | 0    | 0    | 0     | 0                         | 2    | 0    | 0     | 0                         | 0    | 1    | 0     |
| 12:00 PM   | 0                           | 0    | 0    | 0     | 0                          | 0    | 0    | 0     | 0                         | 3    | 0    | 0     | 0                         | 0    | 1    | 1     |
| 12:15 PM   | 0                           | 0    | 0    | 0     | 0                          | 0    | 0    | 0     | 0                         | 1    | 0    | 0     | 0                         | 0    | 1    | 0     |
| 12:30 PM   | 0                           | 0    | 0    | 1     | 0                          | 0    | 0    | 0     | 0                         | 1    | 0    | 0     | 0                         | 0    | 2    | 0     |
| 12:45 PM   | 0                           | 0    | 0    | 0     | 0                          | 0    | 0    | 0     | 0                         | 0    | 0    | 0     | 0                         | 0    | 1    | 1     |
| 1:00 PM    | 0                           | 0    | 0    | 0     | 0                          | 0    | 0    | 0     | 0                         | 1    | 0    | 0     | 0                         | 0    | 2    | 2     |
| 1:15 AM    | 0                           | 0    | 0    | 1     | 0                          | 0    | 0    | 0     | 0                         | 2    | 0    | 0     | 0                         | 0    | 0    | 0     |
| 1:30 AM    | 0                           | 0    | 0    | 0     | 0                          | 0    | 0    | 0     | 0                         | 0    | 0    | 0     | 0                         | 0    | 1    | 1     |
| 1:45 AM    | 0                           | 0    | 0    | 0     | 0                          | 0    | 0    | 0     | 0                         | 1    | 0    | 0     | 0                         | 0    | 0    | 0     |

| SAT PEAK HOUR<br>11:00 AM to 12:00 PM | I-95 NB Off Ramp Northbound |      |      |       | I-95 NB On Ramp Southbound |      |      |       | Highland Avenue Eastbound |      |      |       | Highland Avenue Westbound |      |      |       |
|---------------------------------------|-----------------------------|------|------|-------|----------------------------|------|------|-------|---------------------------|------|------|-------|---------------------------|------|------|-------|
|                                       | U-Turn                      | Left | Thru | Right | U-Turn                     | Left | Thru | Right | U-Turn                    | Left | Thru | Right | U-Turn                    | Left | Thru | Right |
|                                       | 0                           | 0    | 0    | 2     | 0                          | 0    | 0    | 0     | 0                         | 0    | 7    | 0     | 0                         | 0    | 8    | 1     |
| PHF                                   | 0.50                        |      |      |       | 0.00                       |      |      |       | 0.88                      |      |      |       | 0.75                      |      |      |       |

2/4/2018, 10:31 AM, 168\_030\_TMC\_Loc 1 (Saturday)

Client: Matthew Duranleau  
Project #: 168\_030\_VHB  
BTD #: Location 1  
Location: Needham, MA  
Street 1: Highland Avenue  
Street 2: I-95 NB On Ramp/ NB Off Ramp  
Count Date: 2/3/2018  
Day of Week: Saturday  
Weather: Mostly Sunny, 28°F



PEDESTRIANS & BICYCLES

| I-95 NB Off Ramp |      |      |       |     | I-95 NB On Ramp |      |       |     |      | Highland Avenue |       |     |      |      | Highland Avenue |     |  |  |  |
|------------------|------|------|-------|-----|-----------------|------|-------|-----|------|-----------------|-------|-----|------|------|-----------------|-----|--|--|--|
| Southbound       |      |      |       |     | Southbound      |      |       |     |      | Eastbound       |       |     |      |      | Westbound       |     |  |  |  |
| Start Time       | Left | Thru | Right | PED | Left            | Thru | Right | PED | Left | Thru            | Right | PED | Left | Thru | Right           | PED |  |  |  |
| 11:00 AM         | 0    | 0    | 0     | 0   | 0               | 0    | 0     | 1   | 0    | 0               | 0     | 0   | 0    | 0    | 0               | 0   |  |  |  |
| 11:15 AM         | 0    | 0    | 0     | 0   | 0               | 0    | 0     | 0   | 0    | 0               | 0     | 0   | 0    | 0    | 0               | 0   |  |  |  |
| 11:30 AM         | 0    | 0    | 0     | 0   | 0               | 0    | 0     | 0   | 0    | 0               | 0     | 0   | 0    | 1    | 0               | 0   |  |  |  |
| 11:45 AM         | 0    | 0    | 0     | 0   | 0               | 0    | 0     | 0   | 0    | 0               | 0     | 0   | 0    | 0    | 0               | 0   |  |  |  |
| 12:00 PM         | 0    | 0    | 0     | 0   | 0               | 0    | 0     | 0   | 0    | 0               | 0     | 0   | 0    | 0    | 0               | 0   |  |  |  |
| 12:15 PM         | 0    | 0    | 0     | 1   | 0               | 0    | 0     | 0   | 0    | 0               | 0     | 0   | 0    | 0    | 0               | 0   |  |  |  |
| 12:30 PM         | 0    | 0    | 0     | 0   | 0               | 0    | 0     | 0   | 0    | 0               | 0     | 0   | 0    | 0    | 0               | 0   |  |  |  |
| 12:45 PM         | 0    | 0    | 0     | 1   | 0               | 0    | 0     | 0   | 0    | 0               | 0     | 0   | 0    | 0    | 0               | 0   |  |  |  |
| 1:00 PM          | 0    | 0    | 0     | 0   | 0               | 0    | 0     | 0   | 0    | 0               | 0     | 0   | 0    | 0    | 0               | 0   |  |  |  |
| 1:15 AM          | 0    | 0    | 0     | 0   | 0               | 0    | 0     | 0   | 0    | 0               | 0     | 0   | 0    | 0    | 0               | 0   |  |  |  |
| 1:30 AM          | 0    | 0    | 0     | 0   | 0               | 0    | 0     | 1   | 0    | 0               | 0     | 0   | 0    | 0    | 0               | 0   |  |  |  |
| 1:45 AM          | 0    | 0    | 0     | 1   | 0               | 0    | 0     | 0   | 0    | 0               | 0     | 0   | 0    | 0    | 0               | 0   |  |  |  |

| SAT PEAK HOUR<br>12:00 PM<br>to<br>1:00 PM | I-95 NB Off Ramp |      |       |     | I-95 NB On Ramp |      |       |     | Highland Avenue |      |       |     | Highland Avenue |      |       |     |
|--------------------------------------------|------------------|------|-------|-----|-----------------|------|-------|-----|-----------------|------|-------|-----|-----------------|------|-------|-----|
|                                            | Southbound       |      |       |     | Southbound      |      |       |     | Eastbound       |      |       |     | Westbound       |      |       |     |
|                                            | Left             | Thru | Right | PED | Left            | Thru | Right | PED | Left            | Thru | Right | PED | Left            | Thru | Right | PED |
|                                            | 0                | 2    | 0     | 0   | 0               | 0    | 0     | 0   | 0               | 0    | 0     | 0   | 0               | 2    | 0     | 0   |

\* Peak hours corresponds to vehicular peak hours.

Client: Matthew Duranleau  
Project #: 168\_030\_VHB  
BTD #: Location 2  
Location: Needham, MA  
Street 1: Highland Avenue  
Street 2: I-95 NB On Ramp/ NB Off Ramp  
Count Date: 2/3/2018  
Day of Week: Saturday  
Weather: Mostly Sunny, 28°F



TOTAL (CARS & TRUCKS)

| I-95 NB On Ramp<br>Northbound |        |      |      |       | I-95 NB Off Ramp<br>Southbound |      |      |       |        | Highland Avenue<br>Eastbound |      |       |        |      | Highland Avenue<br>Westbound |       |  |  |  |
|-------------------------------|--------|------|------|-------|--------------------------------|------|------|-------|--------|------------------------------|------|-------|--------|------|------------------------------|-------|--|--|--|
| Start Time                    | U-Turn | Left | Thru | Right | U-Turn                         | Left | Thru | Right | U-Turn | Left                         | Thru | Right | U-Turn | Left | Thru                         | Right |  |  |  |
| 11:00 AM                      | 0      | 0    | 0    | 0     | 0                              | 0    | 0    | 17    | 0      | 0                            | 182  | 89    | 0      | 0    | 0                            | 158   |  |  |  |
| 11:15 AM                      | 0      | 0    | 0    | 0     | 0                              | 0    | 0    | 16    | 0      | 0                            | 199  | 92    | 0      | 0    | 0                            | 164   |  |  |  |
| 11:30 AM                      | 0      | 0    | 0    | 0     | 0                              | 0    | 0    | 18    | 0      | 0                            | 201  | 98    | 0      | 0    | 0                            | 168   |  |  |  |
| 11:45 AM                      | 0      | 0    | 0    | 0     | 0                              | 0    | 0    | 20    | 0      | 0                            | 190  | 101   | 0      | 0    | 0                            | 160   |  |  |  |
| 12:00 PM                      | 0      | 0    | 0    | 0     | 0                              | 0    | 0    | 23    | 0      | 0                            | 171  | 99    | 0      | 0    | 0                            | 183   |  |  |  |
| 12:15 PM                      | 0      | 0    | 0    | 0     | 0                              | 0    | 0    | 21    | 0      | 0                            | 189  | 93    | 0      | 0    | 0                            | 203   |  |  |  |
| 12:30 PM                      | 0      | 0    | 0    | 0     | 0                              | 0    | 0    | 19    | 0      | 0                            | 198  | 85    | 0      | 0    | 0                            | 189   |  |  |  |
| 12:45 PM                      | 0      | 0    | 0    | 0     | 0                              | 0    | 0    | 16    | 0      | 0                            | 206  | 74    | 0      | 0    | 0                            | 172   |  |  |  |
| 1:00 PM                       | 0      | 0    | 0    | 0     | 0                              | 0    | 0    | 19    | 0      | 0                            | 175  | 93    | 0      | 0    | 0                            | 169   |  |  |  |
| 1:15 AM                       | 0      | 0    | 0    | 0     | 0                              | 0    | 0    | 22    | 0      | 0                            | 194  | 109   | 0      | 0    | 0                            | 159   |  |  |  |
| 1:30 AM                       | 0      | 0    | 0    | 0     | 0                              | 0    | 0    | 21    | 0      | 0                            | 220  | 107   | 0      | 0    | 0                            | 160   |  |  |  |
| 1:45 AM                       | 0      | 0    | 0    | 0     | 0                              | 0    | 0    | 20    | 0      | 0                            | 206  | 103   | 0      | 0    | 0                            | 154   |  |  |  |

| SAT PEAK HOUR<br>11:45 AM<br>to<br>12:45 PM |  | I-95 NB On Ramp<br>Northbound |      |      |       | I-95 NB Off Ramp<br>Southbound |      |      |       | Highland Avenue<br>Eastbound |      |      |       | Highland Avenue<br>Westbound |      |      |       |
|---------------------------------------------|--|-------------------------------|------|------|-------|--------------------------------|------|------|-------|------------------------------|------|------|-------|------------------------------|------|------|-------|
|                                             |  | U-Turn                        | Left | Thru | Right | U-Turn                         | Left | Thru | Right | U-Turn                       | Left | Thru | Right | U-Turn                       | Left | Thru | Right |
|                                             |  | 0                             | 0    | 0    | 0     | 0                              | 0    | 0    | 83    | 0                            | 0    | 748  | 378   | 0                            | 0    | 735  | 0     |
| PHF                                         |  | 0.00                          |      |      |       | 0.90                           |      |      |       | 0.97                         |      |      |       | 0.91                         |      |      |       |
| HV %                                        |  | 0.0%                          | 0.0% | 0.0% | 0.0%  | 0.0%                           | 0.0% | 0.0% | 1.2%  | 0.0%                         | 0.0% | 0.9% | 1.3%  | 0.0%                         | 0.0% | 0.8% | 0.0%  |

Client: Matthew Duranleau  
Project #: 168\_030\_VHB  
BTD #: Location 2  
Location: Needham, MA  
Street 1: Highland Avenue  
Street 2: I-95 NB On Ramp/ NB Off Ramp  
Count Date: 2/3/2018  
Day of Week: Saturday  
Weather: Mostly Sunny, 28°F



#### TRUCKS

| Start Time           | I-95 NB On Ramp Northbound |      |      | I-95 NB Off Ramp Southbound |        |      | Highland Avenue Eastbound |       |        | Highland Avenue Westbound |      |       |
|----------------------|----------------------------|------|------|-----------------------------|--------|------|---------------------------|-------|--------|---------------------------|------|-------|
|                      | U-Turn                     | Left | Thru | Right                       | U-Turn | Left | Thru                      | Right | U-Turn | Left                      | Thru | Right |
| 11:00 AM             | 0                          | 0    | 0    | 0                           | 0      | 0    | 0                         | 0     | 0      | 0                         | 2    | 0     |
| 11:15 AM             | 0                          | 0    | 0    | 0                           | 0      | 0    | 0                         | 1     | 0      | 0                         | 2    | 0     |
| 11:30 AM             | 0                          | 0    | 0    | 0                           | 0      | 0    | 0                         | 1     | 0      | 0                         | 2    | 0     |
| 11:45 AM             | 0                          | 0    | 0    | 0                           | 0      | 0    | 0                         | 0     | 0      | 2                         | 3    | 0     |
| 12:00 PM             | 0                          | 0    | 0    | 0                           | 0      | 0    | 0                         | 1     | 0      | 0                         | 3    | 2     |
| 12:15 PM             | 0                          | 0    | 0    | 0                           | 0      | 0    | 0                         | 0     | 0      | 1                         | 0    | 0     |
| 12:30 PM             | 0                          | 0    | 0    | 0                           | 0      | 0    | 0                         | 0     | 0      | 1                         | 0    | 0     |
| 12:45 PM             | 0                          | 0    | 0    | 0                           | 0      | 0    | 0                         | 0     | 0      | 1                         | 0    | 0     |
| 1:00 PM              | 0                          | 0    | 0    | 0                           | 0      | 0    | 0                         | 0     | 0      | 1                         | 0    | 0     |
| 1:15 AM              | 0                          | 0    | 0    | 0                           | 0      | 0    | 0                         | 1     | 0      | 0                         | 2    | 0     |
| 1:30 AM              | 0                          | 0    | 0    | 0                           | 0      | 0    | 0                         | 0     | 0      | 1                         | 0    | 0     |
| 1:45 AM              | 0                          | 0    | 0    | 0                           | 0      | 0    | 0                         | 0     | 0      | 1                         | 0    | 0     |
| <b>SAT PEAK HOUR</b> |                            |      |      |                             |        |      |                           |       |        |                           |      |       |
| 11:15 AM to 12:15 PM | 0                          | 0    | 0    | 0                           | 0      | 0    | 0                         | 0     | 0      | 0                         | 8    | 7     |
| <b>PHF</b>           | <b>0.00</b>                |      |      | <b>0.75</b>                 |        |      | <b>0.75</b>               |       |        | <b>0.88</b>               |      |       |

Client: Matthew Duranleau  
Project #: 168\_030\_VHB  
BTD #: Location 2  
Location: Needham, MA  
Street 1: Highland Avenue  
Street 2: I-95 NB On Ramp/ NB Off Ramp  
Count Date: 2/3/2018  
Day of Week: Saturday  
Weather: Mostly Sunny, 28°F



#### PEDESTRIANS & BICYCLES

| Start Time                                        | I-95 NB On Ramp Northbound |      |       |     | I-95 NB Off Ramp Southbound |      |       |     | Highland Avenue Eastbound |      |       |     | Highland Avenue Westbound |      |       |     |
|---------------------------------------------------|----------------------------|------|-------|-----|-----------------------------|------|-------|-----|---------------------------|------|-------|-----|---------------------------|------|-------|-----|
|                                                   | Left                       | Thru | Right | PED | Left                        | Thru | Right | PED | Left                      | Thru | Right | PED | Left                      | Thru | Right | PED |
| 11:00 AM                                          | 0                          | 0    | 0     | 0   | 0                           | 0    | 0     | 1   | 0                         | 0    | 0     | 0   | 0                         | 0    | 0     | 0   |
| 11:15 AM                                          | 0                          | 0    | 0     | 0   | 0                           | 0    | 0     | 0   | 0                         | 0    | 0     | 0   | 0                         | 0    | 0     | 0   |
| 11:30 AM                                          | 0                          | 0    | 0     | 0   | 0                           | 0    | 0     | 0   | 0                         | 0    | 0     | 0   | 0                         | 1    | 0     | 0   |
| 11:45 AM                                          | 0                          | 0    | 0     | 0   | 0                           | 0    | 0     | 0   | 0                         | 0    | 0     | 0   | 0                         | 0    | 0     | 0   |
| 12:00 PM                                          | 0                          | 0    | 0     | 0   | 0                           | 0    | 0     | 0   | 0                         | 0    | 0     | 0   | 0                         | 0    | 0     | 0   |
| 12:15 PM                                          | 0                          | 0    | 0     | 1   | 0                           | 0    | 0     | 0   | 0                         | 0    | 0     | 0   | 0                         | 0    | 0     | 0   |
| 12:30 PM                                          | 0                          | 0    | 0     | 0   | 0                           | 0    | 0     | 0   | 0                         | 0    | 0     | 0   | 0                         | 0    | 0     | 0   |
| 12:45 PM                                          | 0                          | 0    | 0     | 1   | 0                           | 0    | 0     | 0   | 0                         | 0    | 0     | 0   | 0                         | 0    | 0     | 0   |
| 1:00 PM                                           | 0                          | 0    | 0     | 0   | 0                           | 0    | 0     | 0   | 0                         | 0    | 0     | 0   | 0                         | 0    | 0     | 0   |
| 1:15 AM                                           | 0                          | 0    | 0     | 0   | 0                           | 0    | 0     | 0   | 0                         | 0    | 0     | 0   | 0                         | 0    | 0     | 0   |
| 1:30 AM                                           | 0                          | 0    | 0     | 0   | 0                           | 0    | 0     | 1   | 0                         | 0    | 0     | 0   | 0                         | 0    | 0     | 0   |
| 1:45 AM                                           | 0                          | 0    | 0     | 1   | 0                           | 0    | 0     | 0   | 0                         | 0    | 0     | 0   | 0                         | 0    | 0     | 0   |
| <b>SAT PEAK HOUR</b>                              |                            |      |       |     |                             |      |       |     |                           |      |       |     |                           |      |       |     |
| 11:45 AM to 12:45 PM                              | 0                          | 0    | 0     | 1   | 0                           | 0    | 0     | 0   | 0                         | 0    | 0     | 0   | 0                         | 0    | 0     | 0   |
| * Peak hours corresponds to vehicular peak hours. |                            |      |       |     |                             |      |       |     |                           |      |       |     |                           |      |       |     |

Client: Matthew Duranleau  
Project #: 168\_030\_VHB  
BTD #: Location 3  
Location: Needham, MA  
Street 1: Highland Avenue  
Street 2: I-95 SB On Ramp/ SB Off Ramp  
Count Date: 2/3/2018  
Day of Week: Saturday  
Weather: Mostly Sunny, 28°F



**TOTAL (CARS & TRUCKS)**

| Start Time | I-95 SB Off Ramp Northbound |      |      |       | I-95 SB On Ramp Southbound |      |      |       | Highland Avenue Eastbound |      |      |       | Highland Avenue Westbound |      |      |       |
|------------|-----------------------------|------|------|-------|----------------------------|------|------|-------|---------------------------|------|------|-------|---------------------------|------|------|-------|
|            | U-Turn                      | Left | Thru | Right | U-Turn                     | Left | Thru | Right | U-Turn                    | Left | Thru | Right | U-Turn                    | Left | Thru | Right |
| 11:00 AM   | 0                           | 0    | 0    | 75    | 0                          | 0    | 0    | 0     | 0                         | 196  | 0    | 0     | 0                         | 123  | 52   |       |
| 11:15 AM   | 0                           | 0    | 0    | 80    | 0                          | 0    | 0    | 0     | 0                         | 211  | 0    | 0     | 0                         | 126  | 54   |       |
| 11:30 AM   | 0                           | 0    | 0    | 81    | 0                          | 0    | 0    | 0     | 0                         | 218  | 0    | 0     | 0                         | 128  | 58   |       |
| 11:45 AM   | 0                           | 0    | 0    | 77    | 0                          | 0    | 0    | 0     | 0                         | 214  | 0    | 0     | 0                         | 124  | 56   |       |
| 12:00 PM   | 0                           | 0    | 0    | 69    | 0                          | 0    | 0    | 0     | 0                         | 201  | 0    | 0     | 0                         | 145  | 61   |       |
| 12:15 PM   | 0                           | 0    | 0    | 65    | 0                          | 0    | 0    | 0     | 0                         | 217  | 0    | 0     | 0                         | 161  | 63   |       |
| 12:30 PM   | 0                           | 0    | 0    | 58    | 0                          | 0    | 0    | 0     | 0                         | 225  | 0    | 0     | 0                         | 149  | 59   |       |
| 12:45 PM   | 0                           | 0    | 0    | 59    | 0                          | 0    | 0    | 0     | 0                         | 223  | 0    | 0     | 0                         | 135  | 53   |       |
| 1:00 PM    | 0                           | 0    | 0    | 56    | 0                          | 0    | 0    | 0     | 0                         | 212  | 0    | 0     | 0                         | 133  | 55   |       |
| 1:15 AM    | 0                           | 0    | 0    | 75    | 0                          | 0    | 0    | 0     | 0                         | 228  | 0    | 0     | 0                         | 130  | 51   |       |
| 1:30 AM    | 0                           | 0    | 0    | 92    | 0                          | 0    | 0    | 0     | 0                         | 235  | 0    | 0     | 0                         | 131  | 50   |       |
| 1:45 AM    | 0                           | 0    | 0    | 87    | 0                          | 0    | 0    | 0     | 0                         | 224  | 0    | 0     | 0                         | 126  | 48   |       |

| SAT PEAK HOUR<br>11:45 AM to 12:45 PM | I-95 SB Off Ramp Northbound |      |      |       | I-95 SB On Ramp Southbound |      |      |       | Highland Avenue Eastbound |      |      |       | Highland Avenue Westbound |      |      |       |
|---------------------------------------|-----------------------------|------|------|-------|----------------------------|------|------|-------|---------------------------|------|------|-------|---------------------------|------|------|-------|
|                                       | U-Turn                      | Left | Thru | Right | U-Turn                     | Left | Thru | Right | U-Turn                    | Left | Thru | Right | U-Turn                    | Left | Thru | Right |
| PHF                                   | 0.87                        |      |      |       | 0.00                       |      |      |       | 0.95                      |      |      |       | 0.91                      |      |      |       |
| HV %                                  | 0.0%                        | 0.0% | 0.0% | 3.0%  | 0.0%                       | 0.0% | 0.0% | 0.0%  | 0.0%                      | 0.0% | 0.5% | 0.0%  | 0.0%                      | 0.0% | 0.5% | 1.7%  |

Client: Matthew Duranleau  
Project #: 168\_030\_VHB  
BTD #: Location 3  
Location: Needham, MA  
Street 1: Highland Avenue  
Street 2: I-95 SB On Ramp/ SB Off Ramp  
Count Date: 2/3/2018  
Day of Week: Saturday  
Weather: Mostly Sunny, 28°F



**TRUCKS**

| Start Time | I-95 SB Off Ramp Northbound |      |      |       | I-95 SB On Ramp Southbound |      |      |       | Highland Avenue Eastbound |      |      |       | Highland Avenue Westbound |      |      |       |
|------------|-----------------------------|------|------|-------|----------------------------|------|------|-------|---------------------------|------|------|-------|---------------------------|------|------|-------|
|            | U-Turn                      | Left | Thru | Right | U-Turn                     | Left | Thru | Right | U-Turn                    | Left | Thru | Right | U-Turn                    | Left | Thru | Right |
| 11:00 AM   | 0                           | 0    | 0    | 2     | 0                          | 0    | 0    | 0     | 0                         | 1    | 0    | 0     | 0                         | 0    | 0    | 2     |
| 11:15 AM   | 0                           | 0    | 0    | 0     | 0                          | 0    | 0    | 0     | 0                         | 2    | 0    | 0     | 0                         | 0    | 0    | 2     |
| 11:30 AM   | 0                           | 0    | 0    | 1     | 0                          | 0    | 0    | 0     | 0                         | 1    | 0    | 0     | 0                         | 0    | 1    | 3     |
| 11:45 AM   | 0                           | 0    | 0    | 3     | 0                          | 0    | 0    | 0     | 0                         | 2    | 0    | 0     | 0                         | 0    | 0    | 2     |
| 12:00 PM   | 0                           | 0    | 0    | 4     | 0                          | 0    | 0    | 0     | 0                         | 2    | 0    | 0     | 0                         | 0    | 1    | 1     |
| 12:15 PM   | 0                           | 0    | 0    | 0     | 0                          | 0    | 0    | 0     | 0                         | 0    | 0    | 0     | 0                         | 0    | 0    | 1     |
| 12:30 PM   | 0                           | 0    | 0    | 1     | 0                          | 0    | 0    | 0     | 0                         | 0    | 0    | 0     | 0                         | 0    | 2    | 0     |
| 12:45 PM   | 0                           | 0    | 0    | 0     | 0                          | 0    | 0    | 0     | 0                         | 1    | 0    | 0     | 0                         | 0    | 1    | 0     |
| 1:00 PM    | 0                           | 0    | 0    | 1     | 0                          | 0    | 0    | 0     | 0                         | 0    | 0    | 0     | 0                         | 0    | 1    | 1     |
| 1:15 AM    | 0                           | 0    | 0    | 1     | 0                          | 0    | 0    | 0     | 0                         | 1    | 0    | 0     | 0                         | 0    | 0    | 1     |
| 1:30 AM    | 0                           | 0    | 0    | 1     | 0                          | 0    | 0    | 0     | 0                         | 0    | 0    | 0     | 0                         | 0    | 1    | 0     |
| 1:45 AM    | 0                           | 0    | 0    | 0     | 0                          | 0    | 0    | 0     | 0                         | 1    | 0    | 0     | 0                         | 0    | 0    | 0     |

| SAT PEAK HOUR<br>11:15 AM to 12:15 PM | I-95 SB Off Ramp Northbound |      |      |       | I-95 SB On Ramp Southbound |      |      |       | Highland Avenue Eastbound |      |      |       | Highland Avenue Westbound |      |      |       |
|---------------------------------------|-----------------------------|------|------|-------|----------------------------|------|------|-------|---------------------------|------|------|-------|---------------------------|------|------|-------|
|                                       | U-Turn                      | Left | Thru | Right | U-Turn                     | Left | Thru | Right | U-Turn                    | Left | Thru | Right | U-Turn                    | Left | Thru | Right |
| PHF                                   | 0.50                        |      |      |       | 0.00                       |      |      |       | 0.88                      |      |      |       | 0.63                      |      |      |       |

Client: Matthew Duranleau  
Project #: 168\_030\_VHB  
BTD #: Location 3  
Location: Needham, MA  
Street 1: Highland Avenue  
Street 2: I-95 SB On Ramp/ SB Off Ramp  
Count Date: 2/3/2018  
Day of Week: Saturday  
Weather: Mostly Sunny, 28°F



PEDESTRIANS & BICYCLES

| I-95 SB Off Ramp<br>Northbound |      |      |       |     | I-95 SB On Ramp<br>Southbound |      |       |     |      | Highland Avenue<br>Eastbound |       |     |      |      | Highland Avenue<br>Westbound |     |  |  |  |
|--------------------------------|------|------|-------|-----|-------------------------------|------|-------|-----|------|------------------------------|-------|-----|------|------|------------------------------|-----|--|--|--|
| Start Time                     | Left | Thru | Right | PED | Left                          | Thru | Right | PED | Left | Thru                         | Right | PED | Left | Thru | Right                        | PED |  |  |  |
| 11:00 AM                       | 0    | 0    | 0     | 0   | 0                             | 0    | 0     | 0   | 0    | 0                            | 0     | 0   | 0    | 0    | 0                            | 0   |  |  |  |
| 11:15 AM                       | 0    | 0    | 0     | 0   | 0                             | 0    | 0     | 1   | 0    | 0                            | 0     | 0   | 0    | 0    | 0                            | 0   |  |  |  |
| 11:30 AM                       | 0    | 0    | 0     | 0   | 0                             | 0    | 0     | 0   | 0    | 0                            | 0     | 0   | 0    | 0    | 0                            | 0   |  |  |  |
| 11:45 AM                       | 0    | 0    | 0     | 0   | 0                             | 0    | 0     | 0   | 0    | 0                            | 0     | 0   | 0    | 0    | 0                            | 0   |  |  |  |
| 12:00 PM                       | 0    | 0    | 0     | 0   | 0                             | 0    | 0     | 0   | 0    | 0                            | 0     | 0   | 0    | 0    | 0                            | 0   |  |  |  |
| 12:15 PM                       | 0    | 0    | 0     | 0   | 0                             | 0    | 0     | 0   | 0    | 0                            | 0     | 0   | 0    | 0    | 0                            | 0   |  |  |  |
| 12:30 PM                       | 0    | 0    | 0     | 0   | 0                             | 0    | 0     | 0   | 0    | 0                            | 0     | 0   | 0    | 0    | 0                            | 0   |  |  |  |
| 12:45 PM                       | 0    | 0    | 0     | 0   | 0                             | 0    | 0     | 0   | 0    | 0                            | 0     | 0   | 0    | 0    | 0                            | 0   |  |  |  |
| 1:00 PM                        | 0    | 0    | 0     | 0   | 0                             | 0    | 0     | 0   | 0    | 0                            | 0     | 0   | 0    | 0    | 0                            | 0   |  |  |  |
| 1:15 AM                        | 0    | 0    | 0     | 0   | 0                             | 0    | 0     | 0   | 0    | 0                            | 0     | 0   | 0    | 0    | 0                            | 0   |  |  |  |
| 1:30 AM                        | 0    | 0    | 0     | 1   | 0                             | 0    | 0     | 1   | 0    | 0                            | 0     | 0   | 0    | 0    | 0                            | 0   |  |  |  |
| 1:45 AM                        | 0    | 0    | 0     | 0   | 0                             | 0    | 0     | 0   | 0    | 0                            | 0     | 0   | 0    | 0    | 0                            | 0   |  |  |  |

| SAT PEAK HOUR<br>to<br>12:45 PM | I-95 SB Off Ramp<br>Northbound |      |       |     | I-95 SB On Ramp<br>Southbound |      |       |     | Highland Avenue<br>Eastbound |      |       |     | Highland Avenue<br>Westbound |      |       |     |
|---------------------------------|--------------------------------|------|-------|-----|-------------------------------|------|-------|-----|------------------------------|------|-------|-----|------------------------------|------|-------|-----|
|                                 | Left                           | Thru | Right | PED | Left                          | Thru | Right | PED | Left                         | Thru | Right | PED | Left                         | Thru | Right | PED |
|                                 | 0                              | 0    | 0     | 2   | 0                             | 0    | 0     | 0   | 0                            | 0    | 0     | 0   | 0                            | 0    | 0     | 0   |

\* Peak hours corresponds to vehicular peak hours.

Client: Matthew Duranleau  
Project #: 168\_030\_VHB  
BTD #: Location 4  
Location: Needham, MA  
Street 1: Highland Avenue  
Street 2: I-95 SB On Ramp/ SB Off Ramp  
Count Date: 2/3/2018  
Day of Week: Saturday  
Weather: Mostly Sunny, 28°F



TOTAL (CARS & TRUCKS)

| I-95 SB On Ramp<br>Northbound |        |      |      |       | I-95 SB Off Ramp<br>Southbound |      |      |       |        | Highland Avenue<br>Eastbound |      |       |        |      | Highland Avenue<br>Westbound |       |  |  |  |
|-------------------------------|--------|------|------|-------|--------------------------------|------|------|-------|--------|------------------------------|------|-------|--------|------|------------------------------|-------|--|--|--|
| Start Time                    | U-Turn | Left | Thru | Right | U-Turn                         | Left | Thru | Right | U-Turn | Left                         | Thru | Right | U-Turn | Left | Thru                         | Right |  |  |  |
| 11:00 AM                      | 0      | 0    | 0    | 0     | 0                              | 0    | 83   | 0     | 0      | 198                          | 22   | 0     | 0      | 0    | 125                          | 0     |  |  |  |
| 11:15 AM                      | 0      | 0    | 0    | 0     | 0                              | 0    | 87   | 0     | 0      | 209                          | 24   | 0     | 0      | 0    | 127                          | 0     |  |  |  |
| 11:30 AM                      | 0      | 0    | 0    | 0     | 0                              | 0    | 95   | 0     | 0      | 217                          | 26   | 0     | 0      | 0    | 129                          | 0     |  |  |  |
| 11:45 AM                      | 0      | 0    | 0    | 0     | 0                              | 0    | 102  | 0     | 0      | 212                          | 23   | 0     | 0      | 0    | 123                          | 0     |  |  |  |
| 12:00 PM                      | 0      | 0    | 0    | 0     | 0                              | 0    | 97   | 0     | 0      | 203                          | 31   | 0     | 0      | 0    | 143                          | 0     |  |  |  |
| 12:15 PM                      | 0      | 0    | 0    | 0     | 0                              | 0    | 89   | 0     | 0      | 219                          | 37   | 0     | 0      | 0    | 158                          | 0     |  |  |  |
| 12:30 PM                      | 0      | 0    | 0    | 0     | 0                              | 0    | 97   | 0     | 0      | 226                          | 35   | 0     | 0      | 0    | 151                          | 0     |  |  |  |
| 12:45 PM                      | 0      | 0    | 0    | 0     | 0                              | 0    | 101  | 0     | 0      | 221                          | 31   | 0     | 0      | 0    | 133                          | 0     |  |  |  |
| 1:00 PM                       | 0      | 0    | 0    | 0     | 0                              | 0    | 98   | 0     | 0      | 215                          | 30   | 0     | 0      | 0    | 135                          | 0     |  |  |  |
| 1:15 AM                       | 0      | 0    | 0    | 0     | 0                              | 0    | 86   | 0     | 0      | 230                          | 28   | 0     | 0      | 0    | 132                          | 0     |  |  |  |
| 1:30 AM                       | 0      | 0    | 0    | 0     | 0                              | 0    | 88   | 0     | 0      | 234                          | 27   | 0     | 0      | 0    | 134                          | 0     |  |  |  |
| 1:45 AM                       | 0      | 0    | 0    | 0     | 0                              | 0    | 90   | 0     | 0      | 226                          | 25   | 0     | 0      | 0    | 128                          | 0     |  |  |  |

| SAT PEAK HOUR<br>to<br>1:15 AM | I-95 SB On Ramp<br>Northbound |      |      |       | I-95 SB Off Ramp<br>Southbound |      |      |       | Highland Avenue<br>Eastbound |      |      |       | Highland Avenue<br>Westbound |      |      |       |
|--------------------------------|-------------------------------|------|------|-------|--------------------------------|------|------|-------|------------------------------|------|------|-------|------------------------------|------|------|-------|
|                                | U-Turn                        | Left | Thru | Right | U-Turn                         | Left | Thru | Right | U-Turn                       | Left | Thru | Right | U-Turn                       | Left | Thru | Right |
|                                | 0                             | 0    | 0    | 0     | 0                              | 0    | 385  | 0     | 0                            | 881  | 133  | 0     | 0                            | 577  | 0    | 0     |
| PHF                            | 0.00                          |      |      |       | 0.95                           |      |      |       | 0.97                         |      |      |       | 0.91                         |      |      |       |
| HV %                           | 0.0%                          | 0.0% | 0.0% | 0.0%  | 0.0%                           | 0.0% | 0.0% | 0.3%  | 0.0%                         | 0.2% | 1.5% | 0.0%  | 0.0%                         | 0.7% | 0.0% | 0.0%  |

Client: Matthew Duranleau  
Project #: 168\_030\_VHB  
BTD #: Location 4  
Location: Needham, MA  
Street 1: Highland Avenue  
Street 2: I-95 SB On Ramp/ SB Off Ramp  
Count Date: 2/3/2018  
Day of Week: Saturday  
Weather: Mostly Sunny, 28°F



#### TRUCKS

| I-95 SB On Ramp<br>Northbound |                               |      |      | I-95 SB Off Ramp<br>Southbound |                                |      |      | Highland Avenue<br>Eastbound |                              |      |      | Highland Avenue<br>Westbound |                              |      |      |       |
|-------------------------------|-------------------------------|------|------|--------------------------------|--------------------------------|------|------|------------------------------|------------------------------|------|------|------------------------------|------------------------------|------|------|-------|
| Start Time                    | U-Turn                        | Left | Thru | Right                          | U-Turn                         | Left | Thru | Right                        | U-Turn                       | Left | Thru | Right                        | U-Turn                       | Left | Thru | Right |
| 11:00 AM                      | 0                             | 0    | 0    | 0                              | 0                              | 0    | 0    | 0                            | 0                            | 0    | 1    | 0                            | 0                            | 0    | 0    | 0     |
| 11:15 AM                      | 0                             | 0    | 0    | 0                              | 0                              | 0    | 0    | 1                            | 0                            | 0    | 2    | 1                            | 0                            | 0    | 0    | 0     |
| 11:30 AM                      | 0                             | 0    | 0    | 0                              | 0                              | 0    | 0    | 1                            | 0                            | 0    | 1    | 1                            | 0                            | 0    | 1    | 0     |
| 11:45 AM                      | 0                             | 0    | 0    | 0                              | 0                              | 0    | 0    | 0                            | 0                            | 2    | 0    | 0                            | 0                            | 0    | 0    | 0     |
| 12:00 PM                      | 0                             | 0    | 0    | 0                              | 0                              | 0    | 0    | 0                            | 0                            | 0    | 1    | 0                            | 0                            | 0    | 1    | 0     |
| 12:15 PM                      | 0                             | 0    | 0    | 0                              | 0                              | 0    | 0    | 1                            | 0                            | 0    | 1    | 0                            | 0                            | 0    | 0    | 0     |
| 12:30 PM                      | 0                             | 0    | 0    | 0                              | 0                              | 0    | 0    | 0                            | 0                            | 0    | 1    | 0                            | 0                            | 0    | 1    | 0     |
| 12:45 PM                      | 0                             | 0    | 0    | 0                              | 0                              | 0    | 0    | 0                            | 0                            | 0    | 1    | 0                            | 0                            | 0    | 2    | 0     |
| 1:00 PM                       | 0                             | 0    | 0    | 0                              | 0                              | 0    | 0    | 0                            | 0                            | 0    | 1    | 1                            | 0                            | 0    | 1    | 0     |
| 1:15 AM                       | 0                             | 0    | 0    | 0                              | 0                              | 0    | 0    | 1                            | 0                            | 0    | 1    | 0                            | 0                            | 0    | 0    | 0     |
| 1:30 AM                       | 0                             | 0    | 0    | 0                              | 0                              | 0    | 0    | 0                            | 0                            | 0    | 0    | 0                            | 0                            | 0    | 1    | 0     |
| 1:45 AM                       | 0                             | 0    | 0    | 0                              | 0                              | 0    | 0    | 0                            | 0                            | 0    | 1    | 0                            | 0                            | 0    | 0    | 0     |
| <b>SAT PEAK HOUR</b>          |                               |      |      |                                |                                |      |      |                              |                              |      |      |                              |                              |      |      |       |
| 11:15 AM<br>to<br>12:15 PM    | I-95 SB On Ramp<br>Northbound |      |      |                                | I-95 SB Off Ramp<br>Southbound |      |      |                              | Highland Avenue<br>Eastbound |      |      |                              | Highland Avenue<br>Westbound |      |      |       |
|                               | U-Turn                        | Left | Thru | Right                          | U-Turn                         | Left | Thru | Right                        | U-Turn                       | Left | Thru | Right                        | U-Turn                       | Left | Thru | Right |
| <b>PHF</b>                    | <b>0.00</b>                   |      |      |                                | <b>0.50</b>                    |      |      |                              | <b>0.67</b>                  |      |      |                              | <b>0.50</b>                  |      |      |       |

Client: Matthew Duranleau  
Project #: 168\_030\_VHB  
BTD #: Location 4  
Location: Needham, MA  
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Count Date: 2/3/2018  
Day of Week: Saturday  
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#### PEDESTRIANS & BICYCLES

| I-95 SB On Ramp<br>Northbound |                               |      |       |     | I-95 SB Off Ramp<br>Southbound |                                |       |     |      | Highland Avenue<br>Eastbound |                              |     |      |      | Highland Avenue<br>Westbound |                              |  |  |  |  |
|-------------------------------|-------------------------------|------|-------|-----|--------------------------------|--------------------------------|-------|-----|------|------------------------------|------------------------------|-----|------|------|------------------------------|------------------------------|--|--|--|--|
| Start Time                    | Left                          | Thru | Right | PED | Left                           | Thru                           | Right | PED | Left | Thru                         | Right                        | PED | Left | Thru | Right                        | PED                          |  |  |  |  |
| 11:00 AM                      | 0                             | 0    | 0     | 0   | 0                              | 0                              | 0     | 0   | 0    | 0                            | 0                            | 0   | 0    | 0    | 0                            | 0                            |  |  |  |  |
| 11:15 AM                      | 0                             | 0    | 0     | 0   | 0                              | 0                              | 0     | 1   | 0    | 0                            | 0                            | 0   | 0    | 0    | 0                            | 0                            |  |  |  |  |
| 11:30 AM                      | 0                             | 0    | 0     | 0   | 0                              | 0                              | 0     | 0   | 0    | 0                            | 0                            | 0   | 0    | 0    | 0                            | 0                            |  |  |  |  |
| 11:45 AM                      | 0                             | 0    | 0     | 0   | 0                              | 0                              | 0     | 0   | 0    | 0                            | 0                            | 0   | 0    | 0    | 0                            | 0                            |  |  |  |  |
| 12:00 PM                      | 0                             | 0    | 0     | 0   | 0                              | 0                              | 0     | 0   | 0    | 0                            | 0                            | 0   | 0    | 0    | 0                            | 0                            |  |  |  |  |
| 12:15 PM                      | 0                             | 0    | 0     | 0   | 0                              | 0                              | 0     | 0   | 0    | 0                            | 0                            | 0   | 0    | 0    | 0                            | 0                            |  |  |  |  |
| 12:30 PM                      | 0                             | 0    | 0     | 2   | 0                              | 0                              | 0     | 0   | 0    | 0                            | 0                            | 0   | 0    | 0    | 0                            | 0                            |  |  |  |  |
| 12:45 PM                      | 0                             | 0    | 0     | 0   | 0                              | 0                              | 0     | 0   | 0    | 0                            | 0                            | 0   | 0    | 0    | 0                            | 0                            |  |  |  |  |
| 1:00 PM                       | 0                             | 0    | 0     | 0   | 0                              | 0                              | 0     | 0   | 0    | 0                            | 0                            | 0   | 0    | 0    | 0                            | 0                            |  |  |  |  |
| 1:15 AM                       | 0                             | 0    | 0     | 0   | 0                              | 0                              | 0     | 0   | 0    | 0                            | 0                            | 0   | 0    | 0    | 0                            | 0                            |  |  |  |  |
| 1:30 AM                       | 0                             | 0    | 0     | 1   | 0                              | 0                              | 0     | 1   | 0    | 0                            | 0                            | 0   | 0    | 0    | 0                            | 0                            |  |  |  |  |
| 1:45 AM                       | 0                             | 0    | 0     | 0   | 0                              | 0                              | 0     | 0   | 0    | 0                            | 0                            | 0   | 0    | 0    | 0                            | 0                            |  |  |  |  |
| <b>SAT PEAK HOUR</b>          |                               |      |       |     |                                |                                |       |     |      |                              |                              |     |      |      |                              |                              |  |  |  |  |
| 12:15 PM<br>to<br>1:15 AM     | I-95 SB On Ramp<br>Southbound |      |       |     |                                | I-95 SB Off Ramp<br>Northbound |       |     |      |                              | Highland Avenue<br>Eastbound |     |      |      |                              | Highland Avenue<br>Westbound |  |  |  |  |
|                               | Left                          | Thru | Right | PED | Left                           | Thru                           | Right | PED | Left | Thru                         | Right                        | PED | Left | Thru | Right                        | PED                          |  |  |  |  |
|                               | 0                             | 0    | 0     | 2   | 0                              | 0                              | 0     | 0   | 0    | 0                            | 0                            | 0   | 0    | 0    | 0                            | 0                            |  |  |  |  |

Peak hours corresponds to vehicle peak hours.

\* Peak hours corresponds to vehicular peak hours.





Needham Street FDR  
Appendix A – Traffic Volumes

# Accurate Counts

978-664-2565

Location : Highland Avenue  
Location : West of second Avenue  
City/State: Needham, MA

17640002

| Start Time | 4/26/2017<br>Wed | EB      |           | Hour Totals |           | WB      |           | Hour Totals |           | Combined Totals |           |
|------------|------------------|---------|-----------|-------------|-----------|---------|-----------|-------------|-----------|-----------------|-----------|
|            |                  | Morning | Afternoon | Morning     | Afternoon | Morning | Afternoon | Morning     | Afternoon | Morning         | Afternoon |
| 12:00      |                  | 20      | 198       |             |           | 17      | 244       |             |           |                 |           |
| 12:15      |                  | 19      | 164       |             |           | 10      | 252       |             |           |                 |           |
| 12:30      |                  | 27      | 221       |             |           | 3       | 230       |             |           |                 |           |
| 12:45      |                  | 19      | 180       | 85          | 763       | 1       | 236       | 31          | 962       | 116             | 1725      |
| 01:00      |                  | 15      | 177       |             |           | 1       | 245       |             |           |                 |           |
| 01:15      |                  | 8       | 181       |             |           | 1       | 215       |             |           |                 |           |
| 01:30      |                  | 16      | 164       |             |           | 0       | 246       |             |           |                 |           |
| 01:45      |                  | 5       | 154       | 44          | 676       | 0       | 271       | 2           | 977       | 46              | 1653      |
| 02:00      |                  | 5       | 187       |             |           | 2       | 291       |             |           |                 |           |
| 02:15      |                  | 5       | 175       |             |           | 0       | 271       |             |           |                 |           |
| 02:30      |                  | 9       | 158       |             |           | 7       | 316       |             |           |                 |           |
| 02:45      |                  | 8       | 181       | 27          | 701       | 10      | 322       | 19          | 1200      | 46              | 1901      |
| 03:00      |                  | 3       | 188       |             |           | 7       | 331       |             |           |                 |           |
| 03:15      |                  | 0       | 165       |             |           | 4       | 320       |             |           |                 |           |
| 03:30      |                  | 2       | 162       |             |           | 10      | 327       |             |           |                 |           |
| 03:45      |                  | 8       | 151       | 13          | 666       | 7       | 287       | 28          | 1265      | 41              | 1931      |
| 04:00      |                  | 4       | 157       |             |           | 11      | 347       |             |           |                 |           |
| 04:15      |                  | 8       | 175       |             |           | 12      | 333       |             |           |                 |           |
| 04:30      |                  | 20      | 165       |             |           | 12      | 347       |             |           |                 |           |
| 04:45      |                  | 23      | 175       | 55          | 672       | 36      | 347       | 71          | 1374      | 126             | 2046      |
| 05:00      |                  | 42      | 185       |             |           | 24      | 399       |             |           |                 |           |
| 05:15      |                  | 52      | 170       |             |           | 50      | 334       |             |           |                 |           |
| 05:30      |                  | 96      | 163       |             |           | 46      | 320       |             |           |                 |           |
| 05:45      |                  | 142     | 142       | 332         | 660       | 48      | 327       | 168         | 1380      | 500             | 2040      |
| 06:00      |                  | 149     | 205       |             |           | 55      | 272       |             |           |                 |           |
| 06:15      |                  | 165     | 180       |             |           | 70      | 303       |             |           |                 |           |
| 06:30      |                  | 204     | 157       |             |           | 82      | 295       |             |           |                 |           |
| 06:45      |                  | 207     | 171       | 725         | 713       | 134     | 284       | 341         | 1154      | 1066            | 1867      |
| 07:00      |                  | 254     | 163       |             |           | 169     | 230       |             |           |                 |           |
| 07:15      |                  | 237     | 142       |             |           | 226     | 228       |             |           |                 |           |
| 07:30      |                  | 224     | 134       |             |           | 245     | 172       |             |           |                 |           |
| 07:45      |                  | 237     | 102       | 952         | 541       | 258     | 176       | 898         | 806       | 1850            | 1347      |
| 08:00      |                  | 229     | 96        |             |           | 194     | 134       |             |           |                 |           |
| 08:15      |                  | 201     | 80        |             |           | 240     | 146       |             |           |                 |           |
| 08:30      |                  | 209     | 82        |             |           | 222     | 113       |             |           |                 |           |
| 08:45      |                  | 254     | 99        | 893         | 357       | 227     | 120       | 883         | 513       | 1776            | 870       |
| 09:00      |                  | 225     | 92        |             |           | 186     | 112       |             |           |                 |           |
| 09:15      |                  | 201     | 74        |             |           | 220     | 90        |             |           |                 |           |
| 09:30      |                  | 226     | 79        |             |           | 190     | 85        |             |           |                 |           |
| 09:45      |                  | 201     | 49        | 853         | 294       | 176     | 63        | 772         | 350       | 1625            | 644       |
| 10:00      |                  | 224     | 53        |             |           | 182     | 78        |             |           |                 |           |
| 10:15      |                  | 207     | 35        |             |           | 197     | 63        |             |           |                 |           |
| 10:30      |                  | 186     | 43        |             |           | 219     | 47        |             |           |                 |           |
| 10:45      |                  | 223     | 30        | 840         | 161       | 217     | 39        | 815         | 227       | 1655            | 388       |
| 11:00      |                  | 188     | 29        |             |           | 239     | 36        |             |           |                 |           |
| 11:15      |                  | 205     | 31        |             |           | 227     | 35        |             |           |                 |           |
| 11:30      |                  | 173     | 29        |             |           | 212     | 27        |             |           |                 |           |
| 11:45      |                  | 219     | 13        | 785         | 102       | 231     | 40        | 909         | 138       | 1694            | 240       |
| Total      |                  | 5604    | 6306      |             |           | 4937    | 10346     |             |           | 10541           | 16652     |
| Percent    |                  | 47.1%   | 52.9%     |             |           | 32.3%   | 67.7%     |             |           | 38.8%           | 61.2%     |

# Accurate Counts

Location : Highland Avenue  
 Location : West of second Avenue  
 City/State: Needham, MA

978-664-2565

17640002

| Start Time  | 4/27/2017<br>Thu | EB      |           | Hour Totals |           | WB      |           | Hour Totals |           | Combined Totals |           |
|-------------|------------------|---------|-----------|-------------|-----------|---------|-----------|-------------|-----------|-----------------|-----------|
|             |                  | Morning | Afternoon | Morning     | Afternoon | Morning | Afternoon | Morning     | Afternoon | Morning         | Afternoon |
| 12:00       |                  | 15      | 199       |             |           | 28      | 235       |             |           |                 |           |
| 12:15       |                  | 13      | 208       |             |           | 21      | 224       |             |           |                 |           |
| 12:30       |                  | 10      | 198       |             |           | 12      | 280       |             |           |                 |           |
| 12:45       |                  | 6       | 221       | 44          | 826       | 7       | 257       | 68          | 996       | 112             | 1822      |
| 01:00       |                  | 3       | 188       |             |           | 13      | 264       |             |           |                 |           |
| 01:15       |                  | 10      | 190       |             |           | 11      | 272       |             |           |                 |           |
| 01:30       |                  | 6       | 184       |             |           | 5       | 239       |             |           |                 |           |
| 01:45       |                  | 4       | 225       | 23          | 787       | 7       | 278       | 36          | 1053      | 59              | 1840      |
| 02:00       |                  | 7       | 198       |             |           | 9       | 327       |             |           |                 |           |
| 02:15       |                  | 4       | 215       |             |           | 7       | 340       |             |           |                 |           |
| 02:30       |                  | 11      | 197       |             |           | 4       | 339       |             |           |                 |           |
| 02:45       |                  | 9       | 188       | 31          | 798       | 4       | 317       | 24          | 1323      | 55              | 2121      |
| 03:00       |                  | 5       | 198       |             |           | 11      | 338       |             |           |                 |           |
| 03:15       |                  | 4       | 207       |             |           | 0       | 318       |             |           |                 |           |
| 03:30       |                  | 5       | 177       |             |           | 4       | 333       |             |           |                 |           |
| 03:45       |                  | 17      | 226       | 31          | 808       | 8       | 276       | 23          | 1265      | 54              | 2073      |
| 04:00       |                  | 4       | 185       |             |           | 9       | 340       |             |           |                 |           |
| 04:15       |                  | 10      | 162       |             |           | 13      | 367       |             |           |                 |           |
| 04:30       |                  | 19      | 186       |             |           | 21      | 357       |             |           |                 |           |
| 04:45       |                  | 30      | 143       | 63          | 676       | 12      | 340       | 55          | 1404      | 118             | 2080      |
| 05:00       |                  | 47      | 196       |             |           | 16      | 276       |             |           |                 |           |
| 05:15       |                  | 67      | 138       |             |           | 50      | 320       |             |           |                 |           |
| 05:30       |                  | 95      | 140       |             |           | 37      | 348       |             |           |                 |           |
| 05:45       |                  | 151     | 154       | 360         | 628       | 40      | 343       | 143         | 1287      | 503             | 1915      |
| 06:00       |                  | 149     | 185       |             |           | 65      | 350       |             |           |                 |           |
| 06:15       |                  | 209     | 229       |             |           | 84      | 278       |             |           |                 |           |
| 06:30       |                  | 213     | 182       |             |           | 101     | 315       |             |           |                 |           |
| 06:45       |                  | 209     | 184       | 780         | 780       | 124     | 262       | 374         | 1205      | 1154            | 1985      |
| 07:00       |                  | 268     | 155       |             |           | 158     | 255       |             |           |                 |           |
| 07:15       |                  | 241     | 170       |             |           | 244     | 228       |             |           |                 |           |
| 07:30       |                  | 227     | 127       |             |           | 264     | 217       |             |           |                 |           |
| 07:45       |                  | 233     | 112       | 969         | 564       | 212     | 181       | 878         | 881       | 1847            | 1445      |
| 08:00       |                  | 224     | 118       |             |           | 211     | 199       |             |           |                 |           |
| 08:15       |                  | 198     | 140       |             |           | 231     | 179       |             |           |                 |           |
| 08:30       |                  | 209     | 143       |             |           | 236     | 161       |             |           |                 |           |
| 08:45       |                  | 233     | 125       | 864         | 526       | 213     | 144       | 891         | 683       | 1755            | 1209      |
| 09:00       |                  | 223     | 85        |             |           | 234     | 127       |             |           |                 |           |
| 09:15       |                  | 260     | 61        |             |           | 189     | 108       |             |           |                 |           |
| 09:30       |                  | 246     | 46        |             |           | 246     | 110       |             |           |                 |           |
| 09:45       |                  | 251     | 52        | 980         | 244       | 216     | 101       | 885         | 446       | 1865            | 690       |
| 10:00       |                  | 227     | 44        |             |           | 203     | 99        |             |           |                 |           |
| 10:15       |                  | 192     | 48        |             |           | 228     | 86        |             |           |                 |           |
| 10:30       |                  | 190     | 33        |             |           | 192     | 66        |             |           |                 |           |
| 10:45       |                  | 198     | 46        | 807         | 171       | 212     | 49        | 835         | 300       | 1642            | 471       |
| 11:00       |                  | 204     | 31        |             |           | 196     | 52        |             |           |                 |           |
| 11:15       |                  | 219     | 23        |             |           | 257     | 33        |             |           |                 |           |
| 11:30       |                  | 196     | 19        |             |           | 238     | 24        |             |           |                 |           |
| 11:45       |                  | 220     | 22        | 839         | 95        | 239     | 33        | 930         | 142       | 1769            | 237       |
| Total       |                  | 5791    | 6903      |             |           | 5142    | 10985     |             |           | 10933           | 17888     |
| Percent     |                  | 45.6%   | 54.4%     |             |           | 31.9%   | 68.1%     |             |           | 37.9%           | 62.1%     |
| Grand Total |                  | 11395   | 13209     |             |           | 10079   | 21331     |             |           | 21474           | 34540     |
| Percent     |                  | 46.3%   | 53.7%     |             |           | 32.1%   | 67.9%     |             |           | 38.3%           | 61.7%     |

ADT

ADT 27,803

AADT 27,803

# Accurate Counts

978-664-2565

Location : Highland Avenue  
Location : West of second Avenue  
City/State: Needham, MA

17640002

| Start Time | 4/24/2017 |    | Tue |    | Wed   |       | Thu   |       | Fri |    | Sat |    | Sun |    | Week Average |       |
|------------|-----------|----|-----|----|-------|-------|-------|-------|-----|----|-----|----|-----|----|--------------|-------|
|            | EB        | WB | EB  | WB | EB    | WB    | EB    | WB    | EB  | WB | EB  | WB | EB  | WB | EB           | WB    |
| 12:00 AM   | *         | *  | *   | *  | 85    | 31    | 44    | 68    | *   | *  | *   | *  | *   | *  | 64           | 50    |
| 01:00      | *         | *  | *   | *  | 44    | 2     | 23    | 36    | *   | *  | *   | *  | *   | *  | 34           | 19    |
| 02:00      | *         | *  | *   | *  | 27    | 19    | 31    | 24    | *   | *  | *   | *  | *   | *  | 29           | 22    |
| 03:00      | *         | *  | *   | *  | 13    | 28    | 31    | 23    | *   | *  | *   | *  | *   | *  | 22           | 26    |
| 04:00      | *         | *  | *   | *  | 55    | 71    | 63    | 55    | *   | *  | *   | *  | *   | *  | 59           | 63    |
| 05:00      | *         | *  | *   | *  | 332   | 168   | 360   | 143   | *   | *  | *   | *  | *   | *  | 346          | 156   |
| 06:00      | *         | *  | *   | *  | 725   | 341   | 780   | 374   | *   | *  | *   | *  | *   | *  | 752          | 358   |
| 07:00      | *         | *  | *   | *  | 952   | 898   | 969   | 878   | *   | *  | *   | *  | *   | *  | 960          | 888   |
| 08:00      | *         | *  | *   | *  | 893   | 883   | 864   | 891   | *   | *  | *   | *  | *   | *  | 878          | 887   |
| 09:00      | *         | *  | *   | *  | 853   | 772   | 980   | 885   | *   | *  | *   | *  | *   | *  | 916          | 828   |
| 10:00      | *         | *  | *   | *  | 840   | 815   | 807   | 835   | *   | *  | *   | *  | *   | *  | 824          | 825   |
| 11:00      | *         | *  | *   | *  | 785   | 909   | 839   | 930   | *   | *  | *   | *  | *   | *  | 812          | 920   |
| 12:00 PM   | *         | *  | *   | *  | 763   | 962   | 826   | 996   | *   | *  | *   | *  | *   | *  | 794          | 979   |
| 01:00      | *         | *  | *   | *  | 676   | 977   | 787   | 1053  | *   | *  | *   | *  | *   | *  | 732          | 1015  |
| 02:00      | *         | *  | *   | *  | 701   | 1200  | 798   | 1323  | *   | *  | *   | *  | *   | *  | 750          | 1262  |
| 03:00      | *         | *  | *   | *  | 666   | 1265  | 808   | 1265  | *   | *  | *   | *  | *   | *  | 737          | 1265  |
| 04:00      | *         | *  | *   | *  | 672   | 1374  | 676   | 1404  | *   | *  | *   | *  | *   | *  | 674          | 1389  |
| 05:00      | *         | *  | *   | *  | 660   | 1380  | 628   | 1287  | *   | *  | *   | *  | *   | *  | 644          | 1334  |
| 06:00      | *         | *  | *   | *  | 713   | 1154  | 780   | 1205  | *   | *  | *   | *  | *   | *  | 746          | 1180  |
| 07:00      | *         | *  | *   | *  | 541   | 806   | 564   | 881   | *   | *  | *   | *  | *   | *  | 552          | 844   |
| 08:00      | *         | *  | *   | *  | 357   | 513   | 526   | 683   | *   | *  | *   | *  | *   | *  | 442          | 598   |
| 09:00      | *         | *  | *   | *  | 294   | 350   | 244   | 446   | *   | *  | *   | *  | *   | *  | 269          | 398   |
| 10:00      | *         | *  | *   | *  | 161   | 227   | 171   | 300   | *   | *  | *   | *  | *   | *  | 166          | 264   |
| 11:00      | *         | *  | *   | *  | 102   | 138   | 95    | 142   | *   | *  | *   | *  | *   | *  | 98           | 140   |
| Lane       | 0         | 0  | 0   | 0  | 11910 | 15283 | 12694 | 16127 | 0   | 0  | 0   | 0  | 0   | 0  | 12300        | 15710 |
| Day        | 0         |    | 0   |    | 27193 |       | 28821 |       | 0   |    | 0   |    | 0   |    | 28010        |       |
| AM Peak    | -         | -  | -   | -  | 07:00 | 11:00 | 09:00 | 11:00 | -   | -  | -   | -  | -   | -  | 07:00        | 11:00 |
| Vol.       | -         | -  | -   | -  | 952   | 909   | 980   | 930   | -   | -  | -   | -  | -   | -  | 960          | 920   |
| PM Peak    | -         | -  | -   | -  | 12:00 | 17:00 | 12:00 | 16:00 | -   | -  | -   | -  | -   | -  | 12:00        | 16:00 |
| Vol.       | -         | -  | -   | -  | 763   | 1380  | 826   | 1404  | -   | -  | -   | -  | -   | -  | 794          | 1389  |

|             |            |             |       |       |   |   |   |       |
|-------------|------------|-------------|-------|-------|---|---|---|-------|
| Comb. Total | 0          | 0           | 27193 | 28821 | 0 | 0 | 0 | 28010 |
| ADT         | ADT 27,803 | AADT 27,803 |       |       |   |   |   |       |

# Accurate Counts

978-664-2565

Location : Needham Street  
Location : East of Oak Street  
City/State: Newton, MA

17640003

| Start Time  | 4/27/2017<br>Thu | EB      |           | Hour Totals |           | WB      |           | Hour Totals |           | Combined Totals |           |
|-------------|------------------|---------|-----------|-------------|-----------|---------|-----------|-------------|-----------|-----------------|-----------|
|             |                  | Morning | Afternoon | Morning     | Afternoon | Morning | Afternoon | Morning     | Afternoon | Morning         | Afternoon |
| 12:00       |                  | 8       | 241       |             |           | 13      | 185       |             |           |                 |           |
| 12:15       |                  | 6       | 238       |             |           | 10      | 192       |             |           |                 |           |
| 12:30       |                  | 6       | 222       |             |           | 14      | 188       |             |           |                 |           |
| 12:45       |                  | 5       | 250       | 25          | 951       | 8       | 183       | 45          | 748       | 70              | 1699      |
| 01:00       |                  | 0       | 230       |             |           | 6       | 187       |             |           |                 |           |
| 01:15       |                  | 6       | 239       |             |           | 9       | 174       |             |           |                 |           |
| 01:30       |                  | 3       | 201       |             |           | 0       | 173       |             |           |                 |           |
| 01:45       |                  | 1       | 223       | 10          | 893       | 5       | 177       | 20          | 711       | 30              | 1604      |
| 02:00       |                  | 4       | 198       |             |           | 8       | 192       |             |           |                 |           |
| 02:15       |                  | 4       | 196       |             |           | 2       | 189       |             |           |                 |           |
| 02:30       |                  | 10      | 203       |             |           | 1       | 184       |             |           |                 |           |
| 02:45       |                  | 8       | 166       | 26          | 763       | 3       | 163       | 14          | 728       | 40              | 1491      |
| 03:00       |                  | 5       | 225       |             |           | 6       | 167       |             |           |                 |           |
| 03:15       |                  | 2       | 219       |             |           | 1       | 177       |             |           |                 |           |
| 03:30       |                  | 2       | 195       |             |           | 5       | 172       |             |           |                 |           |
| 03:45       |                  | 4       | 206       | 13          | 845       | 11      | 170       | 23          | 686       | 36              | 1531      |
| 04:00       |                  | 0       | 186       |             |           | 7       | 171       |             |           |                 |           |
| 04:15       |                  | 7       | 200       |             |           | 9       | 147       |             |           |                 |           |
| 04:30       |                  | 11      | 184       |             |           | 14      | 180       |             |           |                 |           |
| 04:45       |                  | 13      | 147       | 31          | 717       | 31      | 185       | 61          | 683       | 92              | 1400      |
| 05:00       |                  | 23      | 189       |             |           | 33      | 166       |             |           |                 |           |
| 05:15       |                  | 37      | 177       |             |           | 30      | 184       |             |           |                 |           |
| 05:30       |                  | 54      | 232       |             |           | 61      | 160       |             |           |                 |           |
| 05:45       |                  | 92      | 215       | 206         | 813       | 46      | 181       | 170         | 691       | 376             | 1504      |
| 06:00       |                  | 119     | 228       |             |           | 43      | 186       |             |           |                 |           |
| 06:15       |                  | 118     | 239       |             |           | 68      | 188       |             |           |                 |           |
| 06:30       |                  | 168     | 226       |             |           | 45      | 166       |             |           |                 |           |
| 06:45       |                  | 157     | 189       | 562         | 882       | 96      | 165       | 252         | 705       | 814             | 1587      |
| 07:00       |                  | 199     | 154       |             |           | 128     | 179       |             |           |                 |           |
| 07:15       |                  | 195     | 170       |             |           | 163     | 170       |             |           |                 |           |
| 07:30       |                  | 177     | 167       |             |           | 174     | 154       |             |           |                 |           |
| 07:45       |                  | 214     | 131       | 785         | 622       | 177     | 133       | 642         | 636       | 1427            | 1258      |
| 08:00       |                  | 184     | 134       |             |           | 173     | 139       |             |           |                 |           |
| 08:15       |                  | 200     | 110       |             |           | 205     | 120       |             |           |                 |           |
| 08:30       |                  | 148     | 105       |             |           | 169     | 121       |             |           |                 |           |
| 08:45       |                  | 190     | 70        | 722         | 419       | 186     | 92        | 733         | 472       | 1455            | 891       |
| 09:00       |                  | 199     | 101       |             |           | 146     | 81        |             |           |                 |           |
| 09:15       |                  | 175     | 63        |             |           | 179     | 93        |             |           |                 |           |
| 09:30       |                  | 180     | 51        |             |           | 111     | 72        |             |           |                 |           |
| 09:45       |                  | 178     | 45        | 732         | 260       | 144     | 60        | 580         | 306       | 1312            | 566       |
| 10:00       |                  | 179     | 37        |             |           | 150     | 65        |             |           |                 |           |
| 10:15       |                  | 245     | 32        |             |           | 115     | 59        |             |           |                 |           |
| 10:30       |                  | 173     | 35        |             |           | 125     | 50        |             |           |                 |           |
| 10:45       |                  | 205     | 33        | 802         | 137       | 167     | 51        | 557         | 225       | 1359            | 362       |
| 11:00       |                  | 216     | 22        |             |           | 137     | 42        |             |           |                 |           |
| 11:15       |                  | 220     | 23        |             |           | 177     | 30        |             |           |                 |           |
| 11:30       |                  | 216     | 10        |             |           | 154     | 18        |             |           |                 |           |
| 11:45       |                  | 253     | 17        | 905         | 72        | 164     | 16        | 632         | 106       | 1537            | 178       |
| Total       |                  | 4819    | 7374      |             |           | 3729    | 6697      |             |           | 8548            | 14071     |
| Percent     |                  | 39.5%   | 60.5%     |             |           | 35.8%   | 64.2%     |             |           | 37.8%           | 62.2%     |
| Grand Total |                  | 4819    | 7374      |             |           | 3729    | 6697      |             |           | 8548            | 14071     |
| Percent     |                  | 39.5%   | 60.5%     |             |           | 35.8%   | 64.2%     |             |           | 37.8%           | 62.2%     |

ADT ADT 22,619 AADT 22,619

# Accurate Counts

978-664-2565

Page 1

Location : Needham Street  
Location : East of Oak Street  
City/State: Newton, MA

17640003

| Start Time  | 4/27/2017<br>Thu | EB         | WB          |   |   |   |   |   |   | Total |
|-------------|------------------|------------|-------------|---|---|---|---|---|---|-------|
| 12:00 AM    |                  | 25         | 45          |   |   |   |   |   |   | 70    |
| 01:00       |                  | 10         | 20          |   |   |   |   |   |   | 30    |
| 02:00       |                  | 26         | 14          |   |   |   |   |   |   | 40    |
| 03:00       |                  | 13         | 23          |   |   |   |   |   |   | 36    |
| 04:00       |                  | 31         | 61          |   |   |   |   |   |   | 92    |
| 05:00       |                  | 206        | 170         |   |   |   |   |   |   | 376   |
| 06:00       |                  | 562        | 252         |   |   |   |   |   |   | 814   |
| 07:00       |                  | 785        | 642         |   |   |   |   |   |   | 1427  |
| 08:00       |                  | 722        | 733         |   |   |   |   |   |   | 1455  |
| 09:00       |                  | 732        | 580         |   |   |   |   |   |   | 1312  |
| 10:00       |                  | 802        | 557         |   |   |   |   |   |   | 1359  |
| 11:00       |                  | 905        | 632         |   |   |   |   |   |   | 1537  |
| 12:00 PM    |                  | 951        | 748         |   |   |   |   |   |   | 1699  |
| 01:00       |                  | 893        | 711         |   |   |   |   |   |   | 1604  |
| 02:00       |                  | 763        | 728         |   |   |   |   |   |   | 1491  |
| 03:00       |                  | 845        | 686         |   |   |   |   |   |   | 1531  |
| 04:00       |                  | 717        | 683         |   |   |   |   |   |   | 1400  |
| 05:00       |                  | 813        | 691         |   |   |   |   |   |   | 1504  |
| 06:00       |                  | 882        | 705         |   |   |   |   |   |   | 1587  |
| 07:00       |                  | 622        | 636         |   |   |   |   |   |   | 1258  |
| 08:00       |                  | 419        | 472         |   |   |   |   |   |   | 891   |
| 09:00       |                  | 260        | 306         |   |   |   |   |   |   | 566   |
| 10:00       |                  | 137        | 225         |   |   |   |   |   |   | 362   |
| 11:00       |                  | 72         | 106         |   |   |   |   |   |   | 178   |
| Total       |                  | 12193      | 10426       |   |   |   |   |   |   | 22619 |
| Percent     |                  | 53.9%      | 46.1%       |   |   |   |   |   |   |       |
| AM Peak     | -                | 11:00      | 08:00       | - | - | - | - | - | - | 11:00 |
| Vol.        | -                | 905        | 733         | - | - | - | - | - | - | 1537  |
| PM Peak     | -                | 12:00      | 12:00       | - | - | - | - | - | - | 12:00 |
| Vol.        | -                | 951        | 748         | - | - | - | - | - | - | 1699  |
| Grand Total |                  | 12193      | 10426       |   |   |   |   |   |   | 22619 |
| Percent     |                  | 53.9%      | 46.1%       |   |   |   |   |   |   |       |
| ADT         |                  | ADT 22,619 | AADT 22,619 |   |   |   |   |   |   |       |

# Accurate Counts

978-664-2565

Location : Winchester Street  
Location : North of Needham Street  
City/State: Newton, MA

17640004

| Start Time | 4/26/2017<br>Wed | SB      |           | Hour Totals |           | NB      |           | Hour Totals |           | Combined Totals |           |
|------------|------------------|---------|-----------|-------------|-----------|---------|-----------|-------------|-----------|-----------------|-----------|
|            |                  | Morning | Afternoon | Morning     | Afternoon | Morning | Afternoon | Morning     | Afternoon | Morning         | Afternoon |
| 12:00      |                  | 16      | 155       |             |           | 17      | 183       |             |           |                 |           |
| 12:15      |                  | 13      | 198       |             |           | 8       | 195       |             |           |                 |           |
| 12:30      |                  | 8       | 179       |             |           | 8       | 204       |             |           |                 |           |
| 12:45      |                  | 10      | 174       | 47          | 706       | 8       | 212       | 41          | 794       | 88              | 1500      |
| 01:00      |                  | 6       | 166       |             |           | 7       | 209       |             |           |                 |           |
| 01:15      |                  | 8       | 180       |             |           | 6       | 175       |             |           |                 |           |
| 01:30      |                  | 1       | 176       |             |           | 2       | 194       |             |           |                 |           |
| 01:45      |                  | 4       | 150       | 19          | 672       | 1       | 167       | 16          | 745       | 35              | 1417      |
| 02:00      |                  | 3       | 174       |             |           | 5       | 180       |             |           |                 |           |
| 02:15      |                  | 2       | 226       |             |           | 3       | 197       |             |           |                 |           |
| 02:30      |                  | 4       | 179       |             |           | 5       | 236       |             |           |                 |           |
| 02:45      |                  | 5       | 194       | 14          | 773       | 3       | 216       | 16          | 829       | 30              | 1602      |
| 03:00      |                  | 4       | 204       |             |           | 1       | 229       |             |           |                 |           |
| 03:15      |                  | 6       | 205       |             |           | 3       | 251       |             |           |                 |           |
| 03:30      |                  | 1       | 203       |             |           | 2       | 247       |             |           |                 |           |
| 03:45      |                  | 5       | 199       | 16          | 811       | 2       | 233       | 8           | 960       | 24              | 1771      |
| 04:00      |                  | 8       | 193       |             |           | 4       | 227       |             |           |                 |           |
| 04:15      |                  | 12      | 199       |             |           | 9       | 254       |             |           |                 |           |
| 04:30      |                  | 9       | 223       |             |           | 9       | 258       |             |           |                 |           |
| 04:45      |                  | 14      | 209       | 43          | 824       | 12      | 232       | 34          | 971       | 77              | 1795      |
| 05:00      |                  | 16      | 209       |             |           | 21      | 267       |             |           |                 |           |
| 05:15      |                  | 18      | 208       |             |           | 26      | 280       |             |           |                 |           |
| 05:30      |                  | 36      | 224       |             |           | 63      | 282       |             |           |                 |           |
| 05:45      |                  | 43      | 191       | 113         | 832       | 95      | 304       | 205         | 1133      | 318             | 1965      |
| 06:00      |                  | 29      | 210       |             |           | 110     | 257       |             |           |                 |           |
| 06:15      |                  | 64      | 190       |             |           | 115     | 289       |             |           |                 |           |
| 06:30      |                  | 75      | 203       |             |           | 204     | 255       |             |           |                 |           |
| 06:45      |                  | 113     | 162       | 281         | 765       | 209     | 212       | 638         | 1013      | 919             | 1778      |
| 07:00      |                  | 113     | 154       |             |           | 279     | 175       |             |           |                 |           |
| 07:15      |                  | 183     | 146       |             |           | 322     | 156       |             |           |                 |           |
| 07:30      |                  | 215     | 160       |             |           | 293     | 167       |             |           |                 |           |
| 07:45      |                  | 220     | 119       | 731         | 579       | 270     | 158       | 1164        | 656       | 1895            | 1235      |
| 08:00      |                  | 272     | 111       |             |           | 264     | 139       |             |           |                 |           |
| 08:15      |                  | 226     | 98        |             |           | 306     | 119       |             |           |                 |           |
| 08:30      |                  | 224     | 91        |             |           | 276     | 100       |             |           |                 |           |
| 08:45      |                  | 258     | 89        | 980         | 389       | 233     | 117       | 1079        | 475       | 2059            | 864       |
| 09:00      |                  | 228     | 97        |             |           | 236     | 111       |             |           |                 |           |
| 09:15      |                  | 204     | 79        |             |           | 233     | 127       |             |           |                 |           |
| 09:30      |                  | 145     | 74        |             |           | 202     | 84        |             |           |                 |           |
| 09:45      |                  | 180     | 62        | 757         | 312       | 210     | 63        | 881         | 385       | 1638            | 697       |
| 10:00      |                  | 164     | 58        |             |           | 193     | 54        |             |           |                 |           |
| 10:15      |                  | 167     | 42        |             |           | 216     | 47        |             |           |                 |           |
| 10:30      |                  | 145     | 44        |             |           | 203     | 38        |             |           |                 |           |
| 10:45      |                  | 167     | 40        | 643         | 184       | 220     | 26        | 832         | 165       | 1475            | 349       |
| 11:00      |                  | 137     | 23        |             |           | 191     | 45        |             |           |                 |           |
| 11:15      |                  | 160     | 31        |             |           | 221     | 26        |             |           |                 |           |
| 11:30      |                  | 152     | 19        |             |           | 221     | 24        |             |           |                 |           |
| 11:45      |                  | 153     | 17        | 602         | 90        | 204     | 15        | 837         | 110       | 1439            | 200       |
| Total      |                  | 4246    | 6937      |             |           | 5751    | 8236      |             |           | 9997            | 15173     |
| Percent    |                  | 38.0%   | 62.0%     |             |           | 41.1%   | 58.9%     |             |           | 39.7%           | 60.3%     |

# Accurate Counts

Location : Winchester Street  
 Location : North of Needham Street  
 City/State: Newton, MA

17640004

| Start Time  | 4/27/2017<br>Thu | SB      |           | Hour Totals |           | NB      |           | Hour Totals |           | Combined Totals |           |
|-------------|------------------|---------|-----------|-------------|-----------|---------|-----------|-------------|-----------|-----------------|-----------|
|             |                  | Morning | Afternoon | Morning     | Afternoon | Morning | Afternoon | Morning     | Afternoon | Morning         | Afternoon |
| 12:00       |                  | 12      | 162       |             |           | 19      | 230       |             |           |                 |           |
| 12:15       |                  | 11      | 220       |             |           | 8       | 260       |             |           |                 |           |
| 12:30       |                  | 10      | 186       |             |           | 10      | 211       |             |           |                 |           |
| 12:45       |                  | 10      | 205       | 43          | 773       | 7       | 225       | 44          | 926       | 87              | 1699      |
| 01:00       |                  | 3       | 168       |             |           | 5       | 223       |             |           |                 |           |
| 01:15       |                  | 9       | 170       |             |           | 6       | 219       |             |           |                 |           |
| 01:30       |                  | 3       | 174       |             |           | 7       | 192       |             |           |                 |           |
| 01:45       |                  | 7       | 177       | 22          | 689       | 3       | 220       | 21          | 854       | 43              | 1543      |
| 02:00       |                  | 6       | 186       |             |           | 4       | 226       |             |           |                 |           |
| 02:15       |                  | 2       | 213       |             |           | 5       | 233       |             |           |                 |           |
| 02:30       |                  | 4       | 168       |             |           | 6       | 254       |             |           |                 |           |
| 02:45       |                  | 6       | 226       | 18          | 793       | 5       | 255       | 20          | 968       | 38              | 1761      |
| 03:00       |                  | 1       | 204       |             |           | 5       | 268       |             |           |                 |           |
| 03:15       |                  | 4       | 192       |             |           | 5       | 238       |             |           |                 |           |
| 03:30       |                  | 1       | 206       |             |           | 6       | 244       |             |           |                 |           |
| 03:45       |                  | 2       | 239       | 8           | 841       | 7       | 243       | 23          | 993       | 31              | 1834      |
| 04:00       |                  | 9       | 207       |             |           | 3       | 269       |             |           |                 |           |
| 04:15       |                  | 7       | 197       |             |           | 11      | 249       |             |           |                 |           |
| 04:30       |                  | 11      | 219       |             |           | 11      | 250       |             |           |                 |           |
| 04:45       |                  | 17      | 212       | 44          | 835       | 16      | 244       | 41          | 1012      | 85              | 1847      |
| 05:00       |                  | 15      | 203       |             |           | 22      | 293       |             |           |                 |           |
| 05:15       |                  | 29      | 226       |             |           | 37      | 286       |             |           |                 |           |
| 05:30       |                  | 37      | 220       |             |           | 61      | 274       |             |           |                 |           |
| 05:45       |                  | 40      | 203       | 121         | 852       | 78      | 229       | 198         | 1082      | 319             | 1934      |
| 06:00       |                  | 43      | 233       |             |           | 100     | 286       |             |           |                 |           |
| 06:15       |                  | 81      | 194       |             |           | 140     | 282       |             |           |                 |           |
| 06:30       |                  | 100     | 202       |             |           | 189     | 242       |             |           |                 |           |
| 06:45       |                  | 132     | 202       | 356         | 831       | 170     | 216       | 599         | 1026      | 955             | 1857      |
| 07:00       |                  | 121     | 162       |             |           | 272     | 185       |             |           |                 |           |
| 07:15       |                  | 167     | 142       |             |           | 316     | 168       |             |           |                 |           |
| 07:30       |                  | 200     | 136       |             |           | 290     | 146       |             |           |                 |           |
| 07:45       |                  | 230     | 139       | 718         | 579       | 292     | 164       | 1170        | 663       | 1888            | 1242      |
| 08:00       |                  | 225     | 146       |             |           | 321     | 153       |             |           |                 |           |
| 08:15       |                  | 225     | 102       |             |           | 282     | 149       |             |           |                 |           |
| 08:30       |                  | 216     | 96        |             |           | 273     | 124       |             |           |                 |           |
| 08:45       |                  | 247     | 99        | 913         | 443       | 243     | 120       | 1119        | 546       | 2032            | 989       |
| 09:00       |                  | 210     | 93        |             |           | 262     | 121       |             |           |                 |           |
| 09:15       |                  | 165     | 110       |             |           | 237     | 123       |             |           |                 |           |
| 09:30       |                  | 176     | 63        |             |           | 227     | 72        |             |           |                 |           |
| 09:45       |                  | 200     | 68        | 751         | 334       | 222     | 53        | 948         | 369       | 1699            | 703       |
| 10:00       |                  | 168     | 76        |             |           | 200     | 69        |             |           |                 |           |
| 10:15       |                  | 160     | 66        |             |           | 206     | 48        |             |           |                 |           |
| 10:30       |                  | 148     | 58        |             |           | 224     | 30        |             |           |                 |           |
| 10:45       |                  | 177     | 57        | 653         | 257       | 188     | 31        | 818         | 178       | 1471            | 435       |
| 11:00       |                  | 170     | 43        |             |           | 175     | 42        |             |           |                 |           |
| 11:15       |                  | 191     | 32        |             |           | 191     | 23        |             |           |                 |           |
| 11:30       |                  | 138     | 13        |             |           | 227     | 28        |             |           |                 |           |
| 11:45       |                  | 193     | 23        | 692         | 111       | 222     | 14        | 815         | 107       | 1507            | 218       |
| Total       |                  | 4339    | 7338      |             |           | 5816    | 8724      |             |           | 10155           | 16062     |
| Percent     |                  | 37.2%   | 62.8%     |             |           | 40.0%   | 60.0%     |             |           | 38.7%           | 61.3%     |
| Grand Total |                  | 8585    | 14275     |             |           | 11567   | 16960     |             |           | 20152           | 31235     |
| Percent     |                  | 37.6%   | 62.4%     |             |           | 40.5%   | 59.5%     |             |           | 39.2%           | 60.8%     |

ADT ADT 25,570 AADT 25,570



# Accurate Counts

978-664-2565

Page 1

Location : Winchester Street  
Location : North of Needham Street  
City/State: Newton, MA

17640004

| Start Time | 4/24/2017 |    | Tue |    | Wed   |       | Thu   |       | Fri |    | Sat |    | Sun |    | Week Average |       |
|------------|-----------|----|-----|----|-------|-------|-------|-------|-----|----|-----|----|-----|----|--------------|-------|
|            | SB        | NB | SB  | NB | SB    | NB    | SB    | NB    | SB  | NB | SB  | NB | SB  | NB | SB           | NB    |
| 12:00 AM   | *         | *  | *   | *  | 47    | 41    | 43    | 44    | *   | *  | *   | *  | *   | *  | 45           | 42    |
| 01:00      | *         | *  | *   | *  | 19    | 16    | 22    | 21    | *   | *  | *   | *  | *   | *  | 20           | 18    |
| 02:00      | *         | *  | *   | *  | 14    | 16    | 18    | 20    | *   | *  | *   | *  | *   | *  | 16           | 18    |
| 03:00      | *         | *  | *   | *  | 16    | 8     | 8     | 23    | *   | *  | *   | *  | *   | *  | 12           | 16    |
| 04:00      | *         | *  | *   | *  | 43    | 34    | 44    | 41    | *   | *  | *   | *  | *   | *  | 44           | 38    |
| 05:00      | *         | *  | *   | *  | 113   | 205   | 121   | 198   | *   | *  | *   | *  | *   | *  | 117          | 202   |
| 06:00      | *         | *  | *   | *  | 281   | 638   | 356   | 599   | *   | *  | *   | *  | *   | *  | 318          | 618   |
| 07:00      | *         | *  | *   | *  | 731   | 1164  | 718   | 1170  | *   | *  | *   | *  | *   | *  | 724          | 1167  |
| 08:00      | *         | *  | *   | *  | 980   | 1079  | 913   | 1119  | *   | *  | *   | *  | *   | *  | 946          | 1099  |
| 09:00      | *         | *  | *   | *  | 757   | 881   | 751   | 948   | *   | *  | *   | *  | *   | *  | 754          | 914   |
| 10:00      | *         | *  | *   | *  | 643   | 832   | 653   | 818   | *   | *  | *   | *  | *   | *  | 648          | 825   |
| 11:00      | *         | *  | *   | *  | 602   | 837   | 692   | 815   | *   | *  | *   | *  | *   | *  | 647          | 826   |
| 12:00 PM   | *         | *  | *   | *  | 706   | 794   | 773   | 926   | *   | *  | *   | *  | *   | *  | 740          | 860   |
| 01:00      | *         | *  | *   | *  | 672   | 745   | 689   | 854   | *   | *  | *   | *  | *   | *  | 680          | 800   |
| 02:00      | *         | *  | *   | *  | 773   | 829   | 793   | 968   | *   | *  | *   | *  | *   | *  | 783          | 898   |
| 03:00      | *         | *  | *   | *  | 811   | 960   | 841   | 993   | *   | *  | *   | *  | *   | *  | 826          | 976   |
| 04:00      | *         | *  | *   | *  | 824   | 971   | 835   | 1012  | *   | *  | *   | *  | *   | *  | 830          | 992   |
| 05:00      | *         | *  | *   | *  | 832   | 1133  | 852   | 1082  | *   | *  | *   | *  | *   | *  | 842          | 1108  |
| 06:00      | *         | *  | *   | *  | 765   | 1013  | 831   | 1026  | *   | *  | *   | *  | *   | *  | 798          | 1020  |
| 07:00      | *         | *  | *   | *  | 579   | 656   | 579   | 663   | *   | *  | *   | *  | *   | *  | 579          | 660   |
| 08:00      | *         | *  | *   | *  | 389   | 475   | 443   | 546   | *   | *  | *   | *  | *   | *  | 416          | 510   |
| 09:00      | *         | *  | *   | *  | 312   | 385   | 334   | 369   | *   | *  | *   | *  | *   | *  | 323          | 377   |
| 10:00      | *         | *  | *   | *  | 184   | 165   | 257   | 178   | *   | *  | *   | *  | *   | *  | 220          | 172   |
| 11:00      | *         | *  | *   | *  | 90    | 110   | 111   | 107   | *   | *  | *   | *  | *   | *  | 100          | 108   |
| Lane       | 0         | 0  | 0   | 0  | 11183 | 13987 | 11677 | 14540 | 0   | 0  | 0   | 0  | 0   | 0  | 11428        | 14264 |
| Day        | 0         |    | 0   |    | 25170 |       | 26217 |       | 0   |    | 0   |    | 0   |    | 25692        |       |
| AM Peak    | -         | -  | -   | -  | 08:00 | 07:00 | 08:00 | 07:00 | -   | -  | -   | -  | -   | -  | 08:00        | 07:00 |
| Vol.       | -         | -  | -   | -  | 980   | 1164  | 913   | 1170  | -   | -  | -   | -  | -   | -  | 946          | 1167  |
| PM Peak    | -         | -  | -   | -  | 17:00 | 17:00 | 17:00 | 17:00 | -   | -  | -   | -  | -   | -  | 17:00        | 17:00 |
| Vol.       | -         | -  | -   | -  | 832   | 1133  | 852   | 1082  | -   | -  | -   | -  | -   | -  | 842          | 1108  |

|             |            |             |       |       |   |   |   |       |
|-------------|------------|-------------|-------|-------|---|---|---|-------|
| Comb. Total | 0          | 0           | 25170 | 26217 | 0 | 0 | 0 | 25692 |
| ADT         | ADT 25,570 | AADT 25,570 |       |       |   |   |   |       |

# Accurate Counts

978-664-2565

Location : Needham Street  
Location : East of Oak Street  
City/State: Newton, MA

176400R3

| Start Time  | 5/3/2017<br>Wed | EB      |           | Hour Totals |           | WB      |           | Hour Totals |           | Combined Totals |           |
|-------------|-----------------|---------|-----------|-------------|-----------|---------|-----------|-------------|-----------|-----------------|-----------|
|             |                 | Morning | Afternoon | Morning     | Afternoon | Morning | Afternoon | Morning     | Afternoon | Morning         | Afternoon |
| 12:00       |                 | 6       | 152       |             |           | 16      | 155       |             |           |                 |           |
| 12:15       |                 | 10      | 171       |             |           | 13      | 144       |             |           |                 |           |
| 12:30       |                 | 5       | 141       |             |           | 2       | 168       |             |           |                 |           |
| 12:45       |                 | 2       | 145       | 23          | 609       | 3       | 154       | 34          | 621       | 57              | 1230      |
| 01:00       |                 | 7       | 140       |             |           | 5       | 152       |             |           |                 |           |
| 01:15       |                 | 3       | 168       |             |           | 3       | 159       |             |           |                 |           |
| 01:30       |                 | 5       | 141       |             |           | 1       | 162       |             |           |                 |           |
| 01:45       |                 | 2       | 127       | 17          | 576       | 1       | 160       | 10          | 633       | 27              | 1209      |
| 02:00       |                 | 3       | 120       |             |           | 3       | 158       |             |           |                 |           |
| 02:15       |                 | 6       | 125       |             |           | 2       | 159       |             |           |                 |           |
| 02:30       |                 | 2       | 133       |             |           | 3       | 167       |             |           |                 |           |
| 02:45       |                 | 9       | 126       | 20          | 504       | 4       | 160       | 12          | 644       | 32              | 1148      |
| 03:00       |                 | 5       | 134       |             |           | 4       | 142       |             |           |                 |           |
| 03:15       |                 | 1       | 123       |             |           | 3       | 175       |             |           |                 |           |
| 03:30       |                 | 3       | 129       |             |           | 2       | 151       |             |           |                 |           |
| 03:45       |                 | 5       | 121       | 14          | 507       | 5       | 147       | 14          | 615       | 28              | 1122      |
| 04:00       |                 | 2       | 130       |             |           | 5       | 159       |             |           |                 |           |
| 04:15       |                 | 6       | 136       |             |           | 11      | 133       |             |           |                 |           |
| 04:30       |                 | 10      | 136       |             |           | 10      | 167       |             |           |                 |           |
| 04:45       |                 | 16      | 144       | 34          | 546       | 6       | 157       | 32          | 616       | 66              | 1162      |
| 05:00       |                 | 33      | 153       |             |           | 11      | 153       |             |           |                 |           |
| 05:15       |                 | 35      | 136       |             |           | 6       | 160       |             |           |                 |           |
| 05:30       |                 | 74      | 158       |             |           | 29      | 162       |             |           |                 |           |
| 05:45       |                 | 82      | 147       | 224         | 594       | 36      | 159       | 82          | 634       | 306             | 1228      |
| 06:00       |                 | 92      | 134       |             |           | 34      | 147       |             |           |                 |           |
| 06:15       |                 | 145     | 154       |             |           | 51      | 163       |             |           |                 |           |
| 06:30       |                 | 172     | 181       |             |           | 60      | 119       |             |           |                 |           |
| 06:45       |                 | 146     | 140       | 555         | 609       | 83      | 178       | 228         | 607       | 783             | 1216      |
| 07:00       |                 | 185     | 114       |             |           | 94      | 128       |             |           |                 |           |
| 07:15       |                 | 195     | 115       |             |           | 107     | 172       |             |           |                 |           |
| 07:30       |                 | 181     | 100       |             |           | 113     | 128       |             |           |                 |           |
| 07:45       |                 | 180     | 113       | 741         | 442       | 139     | 129       | 453         | 557       | 1194            | 999       |
| 08:00       |                 | 178     | 85        |             |           | 119     | 112       |             |           |                 |           |
| 08:15       |                 | 165     | 76        |             |           | 151     | 114       |             |           |                 |           |
| 08:30       |                 | 149     | 70        |             |           | 171     | 103       |             |           |                 |           |
| 08:45       |                 | 155     | 59        | 647         | 290       | 139     | 122       | 580         | 451       | 1227            | 741       |
| 09:00       |                 | 179     | 65        |             |           | 140     | 97        |             |           |                 |           |
| 09:15       |                 | 198     | 62        |             |           | 124     | 80        |             |           |                 |           |
| 09:30       |                 | 203     | 40        |             |           | 103     | 89        |             |           |                 |           |
| 09:45       |                 | 188     | 40        | 768         | 207       | 96      | 55        | 463         | 321       | 1231            | 528       |
| 10:00       |                 | 169     | 27        |             |           | 117     | 79        |             |           |                 |           |
| 10:15       |                 | 173     | 25        |             |           | 108     | 39        |             |           |                 |           |
| 10:30       |                 | 170     | 34        |             |           | 118     | 50        |             |           |                 |           |
| 10:45       |                 | 166     | 25        | 678         | 111       | 144     | 30        | 487         | 198       | 1165            | 309       |
| 11:00       |                 | 160     | 23        |             |           | 137     | 35        |             |           |                 |           |
| 11:15       |                 | 163     | 19        |             |           | 132     | 26        |             |           |                 |           |
| 11:30       |                 | 158     | 18        |             |           | 128     | 24        |             |           |                 |           |
| 11:45       |                 | 148     | 14        | 629         | 74        | 134     | 12        | 531         | 97        | 1160            | 171       |
| Total       |                 | 4350    | 5069      |             |           | 2926    | 5994      |             |           | 7276            | 11063     |
| Percent     |                 | 46.2%   | 53.8%     |             |           | 32.8%   | 67.2%     |             |           | 39.7%           | 60.3%     |
| Grand Total |                 | 4350    | 5069      |             |           | 2926    | 5994      |             |           | 7276            | 11063     |
| Percent     |                 | 46.2%   | 53.8%     |             |           | 32.8%   | 67.2%     |             |           | 39.7%           | 60.3%     |

ADT

ADT 18,339

AADT 18,339

# Accurate Counts

978-664-2565

Page 1

Location : Needham Street  
Location : East of Oak Street  
City/State: Newton, MA

176400R3

| Start Time  | 5/3/2017<br>Wed | EB         | WB          |   |   |   |   |   |   | Total |
|-------------|-----------------|------------|-------------|---|---|---|---|---|---|-------|
| 12:00 AM    |                 | 23         | 34          |   |   |   |   |   |   | 57    |
| 01:00       |                 | 17         | 10          |   |   |   |   |   |   | 27    |
| 02:00       |                 | 20         | 12          |   |   |   |   |   |   | 32    |
| 03:00       |                 | 14         | 14          |   |   |   |   |   |   | 28    |
| 04:00       |                 | 34         | 32          |   |   |   |   |   |   | 66    |
| 05:00       |                 | 224        | 82          |   |   |   |   |   |   | 306   |
| 06:00       |                 | 555        | 228         |   |   |   |   |   |   | 783   |
| 07:00       |                 | 741        | 453         |   |   |   |   |   |   | 1194  |
| 08:00       |                 | 647        | 580         |   |   |   |   |   |   | 1227  |
| 09:00       |                 | 768        | 463         |   |   |   |   |   |   | 1231  |
| 10:00       |                 | 678        | 487         |   |   |   |   |   |   | 1165  |
| 11:00       |                 | 629        | 531         |   |   |   |   |   |   | 1160  |
| 12:00 PM    |                 | 609        | 621         |   |   |   |   |   |   | 1230  |
| 01:00       |                 | 576        | 633         |   |   |   |   |   |   | 1209  |
| 02:00       |                 | 504        | 644         |   |   |   |   |   |   | 1148  |
| 03:00       |                 | 507        | 615         |   |   |   |   |   |   | 1122  |
| 04:00       |                 | 546        | 616         |   |   |   |   |   |   | 1162  |
| 05:00       |                 | 594        | 634         |   |   |   |   |   |   | 1228  |
| 06:00       |                 | 609        | 607         |   |   |   |   |   |   | 1216  |
| 07:00       |                 | 442        | 557         |   |   |   |   |   |   | 999   |
| 08:00       |                 | 290        | 451         |   |   |   |   |   |   | 741   |
| 09:00       |                 | 207        | 321         |   |   |   |   |   |   | 528   |
| 10:00       |                 | 111        | 198         |   |   |   |   |   |   | 309   |
| 11:00       |                 | 74         | 97          |   |   |   |   |   |   | 171   |
| Total       |                 | 9419       | 8920        |   |   |   |   |   |   | 18339 |
| Percent     |                 | 51.4%      | 48.6%       |   |   |   |   |   |   |       |
| AM Peak     | -               | 09:00      | 08:00       | - | - | - | - | - | - | 09:00 |
| Vol.        | -               | 768        | 580         | - | - | - | - | - | - | 1231  |
| PM Peak     | -               | 12:00      | 14:00       | - | - | - | - | - | - | 12:00 |
| Vol.        | -               | 609        | 644         | - | - | - | - | - | - | 1230  |
| Grand Total |                 | 9419       | 8920        |   |   |   |   |   |   | 18339 |
| Percent     |                 | 51.4%      | 48.6%       |   |   |   |   |   |   |       |
| ADT         |                 | ADT 18,339 | AADT 18,339 |   |   |   |   |   |   |       |

# Accurate Counts 978-664-2565

N/S Street : Oak St / Christina St  
E/W Street: Needham Street  
City/State : Newton, MA  
Weather : Rain

File Name : 17640005  
Site Code : 17640005  
Start Date : 4/26/2017  
Page No : 1

| Groups Printed- Cars - Trucks |                      |      |       |                         |      |       |                            |      |       |                         |      |       |            |
|-------------------------------|----------------------|------|-------|-------------------------|------|-------|----------------------------|------|-------|-------------------------|------|-------|------------|
| Start Time                    | Oak St<br>From North |      |       | Needham St<br>From East |      |       | Christina St<br>From South |      |       | Needham St<br>From West |      |       | Int. Total |
|                               | Left                 | Thru | Right | Left                    | Thru | Right | Left                       | Thru | Right | Left                    | Thru | Right |            |
| 07:00 AM                      | 19                   | 17   | 18    | 2                       | 82   | 11    | 19                         | 8    | 3     | 20                      | 193  | 15    | 407        |
| 07:15 AM                      | 14                   | 43   | 20    | 9                       | 125  | 16    | 15                         | 27   | 5     | 18                      | 182  | 17    | 491        |
| 07:30 AM                      | 21                   | 38   | 28    | 8                       | 132  | 23    | 22                         | 33   | 6     | 22                      | 174  | 24    | 531        |
| 07:45 AM                      | 30                   | 36   | 34    | 5                       | 136  | 17    | 25                         | 44   | 7     | 24                      | 172  | 18    | 548        |
| Total                         | 84                   | 134  | 100   | 24                      | 475  | 67    | 81                         | 112  | 21    | 84                      | 721  | 74    | 1977       |
| 08:00 AM                      | 25                   | 29   | 25    | 8                       | 146  | 24    | 26                         | 47   | 4     | 26                      | 176  | 17    | 553        |
| 08:15 AM                      | 30                   | 32   | 34    | 7                       | 150  | 24    | 33                         | 57   | 4     | 34                      | 155  | 20    | 580        |
| 08:30 AM                      | 28                   | 29   | 40    | 5                       | 144  | 25    | 30                         | 41   | 6     | 38                      | 130  | 18    | 534        |
| 08:45 AM                      | 34                   | 22   | 34    | 9                       | 134  | 24    | 36                         | 43   | 6     | 20                      | 163  | 15    | 540        |
| Total                         | 117                  | 112  | 133   | 29                      | 574  | 97    | 125                        | 188  | 20    | 118                     | 624  | 70    | 2207       |
| Grand Total                   | 201                  | 246  | 233   | 53                      | 1049 | 164   | 206                        | 300  | 41    | 202                     | 1345 | 144   | 4184       |
| Apprch %                      | 29.6                 | 36.2 | 34.3  | 4.2                     | 82.9 | 13    | 37.7                       | 54.8 | 7.5   | 11.9                    | 79.5 | 8.5   |            |
| Total %                       | 4.8                  | 5.9  | 5.6   | 1.3                     | 25.1 | 3.9   | 4.9                        | 7.2  | 1     | 4.8                     | 32.1 | 3.4   |            |
| Cars                          | 196                  | 242  | 232   | 53                      | 1023 | 161   | 206                        | 297  | 40    | 200                     | 1332 | 144   | 4126       |
| % Cars                        | 97.5                 | 98.4 | 99.6  | 100                     | 97.5 | 98.2  | 100                        | 99   | 97.6  | 99                      | 99   | 100   | 98.6       |
| Trucks                        | 5                    | 4    | 1     | 0                       | 26   | 3     | 0                          | 3    | 1     | 2                       | 13   | 0     | 58         |
| % Trucks                      | 2.5                  | 1.6  | 0.4   | 0                       | 2.5  | 1.8   | 0                          | 1    | 2.4   | 1                       | 1    | 0     | 1.4        |

# Accurate Counts 978-664-2565

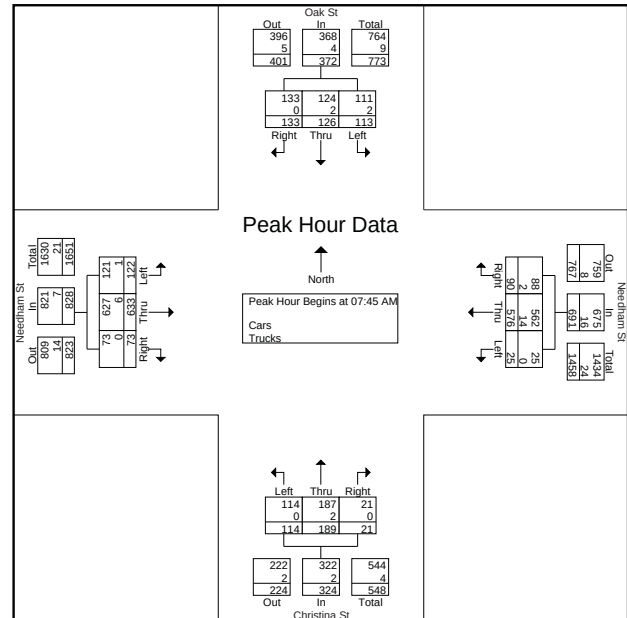
N/S Street : Oak St / Christina St  
E/W Street: Needham Street  
City/State : Newton, MA  
Weather : Rain

File Name : 17640005  
Site Code : 17640005  
Start Date : 4/26/2017  
Page No : 2

| Start Time   | Oak St<br>From North |      |       |            | Needham St<br>From East |      |       |            | Christina St<br>From South |      |       |            | Needham St<br>From West |      |       |            | Int. Total |
|--------------|----------------------|------|-------|------------|-------------------------|------|-------|------------|----------------------------|------|-------|------------|-------------------------|------|-------|------------|------------|
|              | Left                 | Thru | Right | App. Total | Left                    | Thru | Right | App. Total | Left                       | Thru | Right | App. Total | Left                    | Thru | Right | App. Total |            |
| 07:45 AM     | 30                   | 36   | 34    | 100        | 5                       | 136  | 17    | 158        | 25                         | 44   | 7     | 76         | 24                      | 172  | 18    | 214        | 548        |
| 08:00 AM     | 25                   | 29   | 25    | 79         | 8                       | 146  | 24    | 178        | 26                         | 47   | 4     | 77         | 26                      | 176  | 17    | 219        | 553        |
| 08:15 AM     | 30                   | 32   | 34    | 96         | 7                       | 150  | 24    | 181        | 33                         | 57   | 4     | 94         | 34                      | 155  | 20    | 209        | 580        |
| 08:30 AM     | 28                   | 29   | 40    | 97         | 5                       | 144  | 25    | 174        | 30                         | 41   | 6     | 77         | 38                      | 130  | 18    | 186        | 534        |
| Total Volume | 113                  | 126  | 133   | 372        | 25                      | 576  | 90    | 691        | 114                        | 189  | 21    | 324        | 122                     | 633  | 73    | 828        | 2215       |
| % App. Total | 30.4                 | 33.9 | 35.8  |            | 3.6                     | 83.4 | 13    |            | 35.2                       | 58.3 | 6.5   |            | 14.7                    | 76.4 | 8.8   |            |            |
| PHF          | .942                 | .875 | .831  | .930       | .781                    | .960 | .900  | .954       | .864                       | .829 | .750  | .862       | .803                    | .899 | .913  | .945       | .955       |
| Cars         | 111                  | 124  | 133   | 368        | 25                      | 562  | 88    | 675        | 114                        | 187  | 21    | 322        | 121                     | 627  | 73    | 821        | 2186       |
| % Cars       | 98.2                 | 98.4 | 100   | 98.9       | 100                     | 97.6 | 97.8  | 97.7       | 100                        | 98.9 | 100   | 99.4       | 99.2                    | 99.1 | 100   | 99.2       | 98.7       |
| Trucks       | 2                    | 2    | 0     | 4          | 0                       | 14   | 2     | 16         | 0                          | 2    | 0     | 2          | 1                       | 6    | 0     | 7          | 29         |
| % Trucks     | 1.8                  | 1.6  | 0     | 1.1        | 0                       | 2.4  | 2.2   | 2.3        | 0                          | 1.1  | 0     | 0.6        | 0.8                     | 0.9  | 0     | 0.8        | 1.3        |

Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1

Peak Hour for Entire Intersection Begins at 07:45 AM



**Accurate Counts**  
978-664-2565

N/S Street : Oak St / Christina St  
E/W Street: Needham Street  
City/State : Newton, MA  
Weather : Rain

File Name : 17640005  
Site Code : 17640005  
Start Date : 4/26/2017  
Page No : 4

| Groups Printed- Cars |                      |      |       |                         |      |       |                            |      |       |                         |      |       |            |
|----------------------|----------------------|------|-------|-------------------------|------|-------|----------------------------|------|-------|-------------------------|------|-------|------------|
|                      | Oak St<br>From North |      |       | Needham St<br>From East |      |       | Christina St<br>From South |      |       | Needham St<br>From West |      |       |            |
| Start Time           | Left                 | Thru | Right | Left                    | Thru | Right | Left                       | Thru | Right | Left                    | Thru | Right | Int. Total |
| 07:00 AM             | 17                   | 16   | 18    | 2                       | 76   | 11    | 19                         | 8    | 3     | 20                      | 191  | 15    | 396        |
| 07:15 AM             | 14                   | 43   | 20    | 9                       | 124  | 16    | 15                         | 27   | 4     | 18                      | 178  | 17    | 485        |
| 07:30 AM             | 21                   | 37   | 28    | 8                       | 129  | 22    | 22                         | 32   | 6     | 21                      | 174  | 24    | 524        |
| 07:45 AM             | 29                   | 36   | 34    | 5                       | 132  | 16    | 25                         | 42   | 7     | 24                      | 171  | 18    | 539        |
| Total                | 81                   | 132  | 100   | 24                      | 461  | 65    | 81                         | 109  | 20    | 83                      | 714  | 74    | 1944       |
| 08:00 AM             | 24                   | 27   | 25    | 8                       | 143  | 23    | 26                         | 47   | 4     | 25                      | 174  | 17    | 543        |
| 08:15 AM             | 30                   | 32   | 34    | 7                       | 144  | 24    | 33                         | 57   | 4     | 34                      | 153  | 20    | 572        |
| 08:30 AM             | 28                   | 29   | 40    | 5                       | 143  | 25    | 30                         | 41   | 6     | 38                      | 129  | 18    | 532        |
| 08:45 AM             | 33                   | 22   | 33    | 9                       | 132  | 24    | 36                         | 43   | 6     | 20                      | 162  | 15    | 535        |
| Total                | 115                  | 110  | 132   | 29                      | 562  | 96    | 125                        | 188  | 20    | 117                     | 618  | 70    | 2182       |
| Grand Total          | 196                  | 242  | 232   | 53                      | 1023 | 161   | 206                        | 297  | 40    | 200                     | 1332 | 144   | 4126       |
| Apprch %             | 29.3                 | 36.1 | 34.6  | 4.3                     | 82.7 | 13    | 37.9                       | 54.7 | 7.4   | 11.9                    | 79.5 | 8.6   |            |
| Total %              | 4.8                  | 5.9  | 5.6   | 1.3                     | 24.8 | 3.9   | 5                          | 7.2  | 1     | 4.8                     | 32.3 | 3.5   |            |

**Accurate Counts**  
978-664-2565

N/S Street : Oak St / Christina St  
E/W Street: Needham Street  
City/State : Newton, MA  
Weather : Rain

File Name : 17640005  
Site Code : 17640005  
Start Date : 4/26/2017  
Page No : 7

| Groups Printed- Trucks |                      |      |       |                         |      |       |                            |      |       |                         |      |       |            |
|------------------------|----------------------|------|-------|-------------------------|------|-------|----------------------------|------|-------|-------------------------|------|-------|------------|
|                        | Oak St<br>From North |      |       | Needham St<br>From East |      |       | Christina St<br>From South |      |       | Needham St<br>From West |      |       |            |
| Start Time             | Left                 | Thru | Right | Left                    | Thru | Right | Left                       | Thru | Right | Left                    | Thru | Right | Int. Total |
| 07:00 AM               | 2                    | 1    | 0     | 0                       | 6    | 0     | 0                          | 0    | 0     | 0                       | 2    | 0     | 11         |
| 07:15 AM               | 0                    | 0    | 0     | 0                       | 1    | 0     | 0                          | 0    | 1     | 0                       | 4    | 0     | 6          |
| 07:30 AM               | 0                    | 1    | 0     | 0                       | 3    | 1     | 0                          | 1    | 0     | 1                       | 0    | 0     | 7          |
| 07:45 AM               | 1                    | 0    | 0     | 0                       | 4    | 1     | 0                          | 2    | 0     | 0                       | 1    | 0     | 9          |
| Total                  | 3                    | 2    | 0     | 0                       | 14   | 2     | 0                          | 3    | 1     | 1                       | 7    | 0     | 33         |
| 08:00 AM               | 1                    | 2    | 0     | 0                       | 3    | 1     | 0                          | 0    | 0     | 1                       | 2    | 0     | 10         |
| 08:15 AM               | 0                    | 0    | 0     | 0                       | 6    | 0     | 0                          | 0    | 0     | 0                       | 2    | 0     | 8          |
| 08:30 AM               | 0                    | 0    | 0     | 0                       | 1    | 0     | 0                          | 0    | 0     | 0                       | 1    | 0     | 2          |
| 08:45 AM               | 1                    | 0    | 1     | 0                       | 2    | 0     | 0                          | 0    | 0     | 0                       | 1    | 0     | 5          |
| Total                  | 2                    | 2    | 1     | 0                       | 12   | 1     | 0                          | 0    | 0     | 1                       | 6    | 0     | 25         |
| Grand Total            | 5                    | 4    | 1     | 0                       | 26   | 3     | 0                          | 3    | 1     | 2                       | 13   | 0     | 58         |
| Apprch %               | 50                   | 40   | 10    | 0                       | 89.7 | 10.3  | 0                          | 75   | 25    | 13.3                    | 86.7 | 0     |            |
| Total %                | 8.6                  | 6.9  | 1.7   | 0                       | 44.8 | 5.2   | 0                          | 5.2  | 1.7   | 3.4                     | 22.4 | 0     |            |

Accurate Counts  
978-664-2565

N/S Street : Oak St / Christina St  
E/W Street: Needham Street  
City/State : Newton, MA  
Weather : Rain

File Name : 17640005  
Site Code : 17640005  
Start Date : 4/26/2017  
Page No : 10

| Groups Printed- Bikes, Peds |                      |      |       |      |                         |      |       |      |                            |      |       |      |                         |      |       |      |              |              |            |
|-----------------------------|----------------------|------|-------|------|-------------------------|------|-------|------|----------------------------|------|-------|------|-------------------------|------|-------|------|--------------|--------------|------------|
|                             | Oak St<br>From North |      |       |      | Needham St<br>From East |      |       |      | Christina St<br>From South |      |       |      | Needham St<br>From West |      |       |      |              |              |            |
| Start Time                  | Left                 | Thru | Right | Peds | Left                    | Thru | Right | Peds | Left                       | Thru | Right | Peds | Left                    | Thru | Right | Peds | Excls. Total | Incls. Total | Int. Total |
| 07:00 AM                    | 0                    | 0    | 0     | 0    | 0                       | 0    | 0     | 0    | 0                          | 0    | 0     | 0    | 0                       | 0    | 0     | 0    | 0            | 0            | 0          |
| 07:15 AM                    | 0                    | 0    | 0     | 0    | 0                       | 0    | 0     | 1    | 0                          | 0    | 0     | 0    | 0                       | 0    | 0     | 0    | 1            | 0            | 1          |
| 07:30 AM                    | 0                    | 0    | 0     | 0    | 0                       | 0    | 0     | 4    | 0                          | 0    | 0     | 0    | 0                       | 1    | 0     | 0    | 4            | 1            | 5          |
| 07:45 AM                    | 0                    | 0    | 0     | 0    | 0                       | 0    | 0     | 0    | 0                          | 0    | 0     | 0    | 0                       | 0    | 0     | 0    | 0            | 0            | 0          |
| Total                       | 0                    | 0    | 0     | 0    | 0                       | 0    | 0     | 5    | 0                          | 0    | 0     | 0    | 0                       | 1    | 0     | 0    | 5            | 1            | 6          |
| 08:00 AM                    | 0                    | 0    | 0     | 2    | 0                       | 0    | 0     | 1    | 0                          | 0    | 0     | 0    | 0                       | 0    | 0     | 0    | 3            | 0            | 3          |
| 08:15 AM                    | 0                    | 0    | 0     | 0    | 0                       | 0    | 0     | 0    | 0                          | 0    | 0     | 1    | 0                       | 0    | 0     | 0    | 1            | 0            | 1          |
| 08:30 AM                    | 0                    | 0    | 0     | 0    | 0                       | 0    | 0     | 1    | 0                          | 0    | 0     | 0    | 0                       | 0    | 0     | 0    | 1            | 0            | 1          |
| 08:45 AM                    | 0                    | 0    | 0     | 0    | 0                       | 0    | 0     | 4    | 0                          | 0    | 0     | 1    | 0                       | 0    | 0     | 0    | 5            | 0            | 5          |
| Total                       | 0                    | 0    | 0     | 2    | 0                       | 0    | 0     | 6    | 0                          | 0    | 0     | 2    | 0                       | 0    | 0     | 0    | 10           | 0            | 10         |
| Grand Total                 | 0                    | 0    | 0     | 2    | 0                       | 0    | 0     | 11   | 0                          | 0    | 0     | 2    | 0                       | 1    | 0     | 0    | 15           | 1            | 16         |
| Apprch %                    | 0                    | 0    | 0     |      | 0                       | 0    | 0     |      | 0                          | 0    | 0     |      | 0                       | 100  | 0     |      |              |              |            |
| Total %                     | 0                    | 0    | 0     |      | 0                       | 0    | 0     |      | 0                          | 0    | 0     |      | 0                       | 100  | 0     |      | 93.8         | 6.2          |            |

Accurate Counts  
978-664-2565

N/S Street : Oak St / Christina St  
E/W Street: Needham Street  
City/State : Newton, MA  
Weather : Rain

File Name : 17640005  
Site Code : 17640005  
Start Date : 4/26/2017  
Page No : 1

| Groups Printed- Cars - Trucks |                      |      |       |                         |      |       |                            |      |       |                         |      |       |
|-------------------------------|----------------------|------|-------|-------------------------|------|-------|----------------------------|------|-------|-------------------------|------|-------|
|                               | Oak St<br>From North |      |       | Needham St<br>From East |      |       | Christina St<br>From South |      |       | Needham St<br>From West |      |       |
| Start Time                    | Left                 | Thru | Right | Left                    | Thru | Right | Left                       | Thru | Right | Left                    | Thru | Right |
| 04:00 PM                      | 42                   | 18   | 44    | 3                       | 136  | 36    | 61                         | 27   | 7     | 27                      | 128  | 14    |
| 04:15 PM                      | 26                   | 17   | 36    | 5                       | 148  | 38    | 46                         | 27   | 10    | 31                      | 135  | 13    |
| 04:30 PM                      | 38                   | 24   | 36    | 6                       | 142  | 32    | 27                         | 28   | 11    | 24                      | 142  | 11    |
| 04:45 PM                      | 39                   | 21   | 27    | 14                      | 156  | 26    | 28                         | 31   | 10    | 29                      | 151  | 21    |
| Total                         | 145                  | 80   | 143   | 28                      | 582  | 132   | 162                        | 113  | 38    | 111                     | 556  | 59    |
| 05:00 PM                      | 38                   | 29   | 51    | 7                       | 143  | 23    | 32                         | 21   | 11    | 41                      | 149  | 22    |
| 05:15 PM                      | 33                   | 35   | 28    | 9                       | 140  | 31    | 28                         | 42   | 10    | 39                      | 164  | 16    |
| 05:30 PM                      | 41                   | 23   | 25    | 16                      | 148  | 33    | 20                         | 28   | 9     | 41                      | 173  | 21    |
| 05:45 PM                      | 36                   | 36   | 30    | 3                       | 125  | 25    | 28                         | 38   | 14    | 31                      | 161  | 27    |
| Total                         | 148                  | 123  | 134   | 35                      | 556  | 112   | 108                        | 129  | 44    | 152                     | 647  | 86    |
| Grand Total                   | 293                  | 203  | 277   | 63                      | 1138 | 244   | 270                        | 242  | 82    | 263                     | 1203 | 145   |
| Apprch %                      | 37.9                 | 26.3 | 35.8  | 4.4                     | 78.8 | 16.9  | 45.5                       | 40.7 | 13.8  | 16.3                    | 74.7 | 9     |
| Total %                       | 6.6                  | 4.6  | 6.3   | 1.4                     | 25.7 | 5.5   | 6.1                        | 5.5  | 1.9   | 5.9                     | 27.2 | 3.3   |
| Cars                          | 290                  | 203  | 276   | 63                      | 1130 | 241   | 270                        | 240  | 82    | 263                     | 1200 | 145   |
| % Cars                        | 99                   | 100  | 99.6  | 100                     | 99.3 | 98.8  | 100                        | 99.2 | 100   | 100                     | 99.8 | 100   |
| Trucks                        | 3                    | 0    | 1     | 0                       | 8    | 3     | 0                          | 2    | 0     | 0                       | 3    | 0     |
| % Trucks                      | 1                    | 0    | 0.4   | 0                       | 0.7  | 1.2   | 0                          | 0.8  | 0     | 0                       | 0.2  | 0     |

# **Accurate Counts** 978-664-2565

N/S Street : Oak St / Christina St  
E/W Street: Needham Street  
City/State : Newton, MA  
Weather : Rain

File Name : 17640005  
Site Code : 17640005  
Start Date : 4/26/2017  
Page No : 2

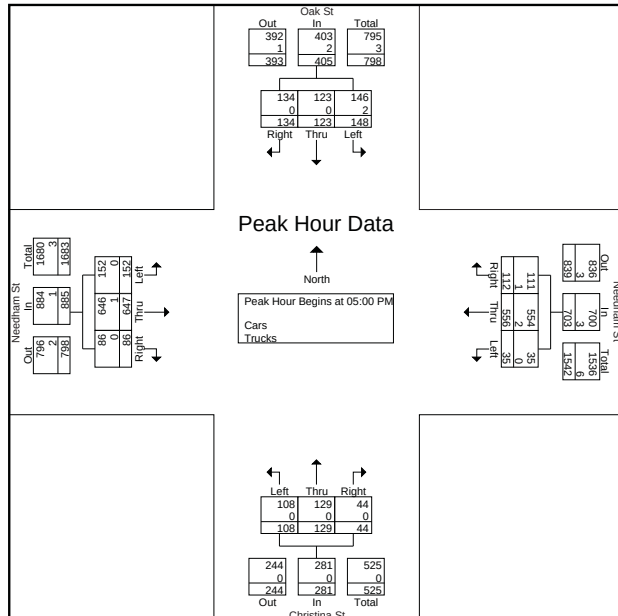
|                                                            | Oak St<br>From North |           |           |            | Needham St<br>From East |            |           |            | Christina St<br>From South |           |           |            | Needham St<br>From West |            |           |            |            |
|------------------------------------------------------------|----------------------|-----------|-----------|------------|-------------------------|------------|-----------|------------|----------------------------|-----------|-----------|------------|-------------------------|------------|-----------|------------|------------|
| Start Time                                                 | Left                 | Thru      | Right     | App. Total | Left                    | Thru       | Right     | App. Total | Left                       | Thru      | Right     | App. Total | Left                    | Thru       | Right     | App. Total | Int. Total |
| Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1 |                      |           |           |            |                         |            |           |            |                            |           |           |            |                         |            |           |            |            |
| Peak Hour for Entire Intersection Begins at 05:00 PM       |                      |           |           |            |                         |            |           |            |                            |           |           |            |                         |            |           |            |            |
| 05:00 PM                                                   | 38                   | 29        | <b>51</b> | <b>118</b> | 7                       | 143        | 23        | 173        | <b>32</b>                  | 21        | 11        | 64         | <b>41</b>               | 149        | 22        | 212        | 567        |
| 05:15 PM                                                   | 33                   | 35        | 28        | 96         | 9                       | 140        | 31        | 180        | 28                         | <b>42</b> | 10        | <b>80</b>  | 39                      | 164        | 16        | 219        | 575        |
| 05:30 PM                                                   | <b>41</b>            | 23        | 25        | 89         | <b>16</b>               | <b>148</b> | <b>33</b> | <b>197</b> | 20                         | 28        | 9         | 57         | 41                      | <b>173</b> | 21        | <b>235</b> | <b>578</b> |
| 05:45 PM                                                   | 36                   | <b>36</b> | 30        | 102        | 3                       | 125        | 25        | 153        | 28                         | 38        | <b>14</b> | 80         | 31                      | 161        | <b>27</b> | 219        | 554        |
| Total Volume                                               | 148                  | 123       | 134       | 405        | 35                      | 556        | 112       | 703        | 108                        | 129       | 44        | 281        | 152                     | 647        | 86        | 885        | 2274       |
| % App. Total                                               | 36.5                 | 30.4      | 33.1      |            | 5                       | 79.1       | 15.9      |            | 38.4                       | 45.9      | 15.7      |            | 17.2                    | 73.1       | 9.7       |            |            |
| PHF                                                        | .902                 | .854      | .657      | .858       | .547                    | .939       | .848      | .892       | .844                       | .768      | .786      | .878       | .927                    | .935       | .796      | .941       | .984       |
| Cars                                                       | 146                  | 123       | 134       | 403        | 35                      | 554        | 111       | 700        | 108                        | 129       | 44        | 281        | 152                     | 646        | 86        | 884        | 2268       |
| % Cars                                                     | 98.6                 | 100       | 100       | 99.5       | 100                     | 99.6       | 99.1      | 99.6       | 100                        | 100       | 100       | 100        | 100                     | 99.8       | 100       | 99.9       | 99.7       |
| Trucks                                                     | 2                    | 0         | 0         | 2          | 0                       | 2          | 1         | 3          | 0                          | 0         | 0         | 0          | 0                       | 1          | 0         | 1          | 6          |
| % Trucks                                                   | 1.4                  | 0         | 0         | 0.5        | 0                       | 0.4        | 0.9       | 0.4        | 0                          | 0         | 0         | 0          | 0                       | 0.2        | 0         | 0.1        | 0.3        |

# **Accurate Counts** 978-664-2565

N/S Street : Oak St / Christina St  
E/W Street: Needham Street  
City/State : Newton, MA  
Weather : Rain

File Name : 17640005  
Site Code : 17640005  
Start Date : 4/26/2017  
Page No : 4

| Groups Printed- Cars |                      |      |       |                         |      |       |                            |      |       |                         |      |       |      |      |       |            |  |
|----------------------|----------------------|------|-------|-------------------------|------|-------|----------------------------|------|-------|-------------------------|------|-------|------|------|-------|------------|--|
|                      | Oak St<br>From North |      |       | Needham St<br>From East |      |       | Christina St<br>From South |      |       | Needham St<br>From West |      |       |      |      |       |            |  |
| Start Time           | Left                 | Thru | Right | Left                    | Thru | Right | Left                       | Thru | Right | Left                    | Thru | Right | Left | Thru | Right | Int. Total |  |
| 04:00 PM             | 41                   | 18   | 43    | 3                       | 134  | 34    | 61                         | 26   | 7     | 27                      | 128  | 14    |      |      |       | 536        |  |
| 04:15 PM             | 26                   | 17   | 36    | 5                       | 148  | 38    | 46                         | 26   | 10    | 31                      | 133  | 13    |      |      |       | 529        |  |
| 04:30 PM             | 38                   | 24   | 36    | 6                       | 141  | 32    | 27                         | 28   | 11    | 24                      | 142  | 11    |      |      |       | 520        |  |
| 04:45 PM             | 39                   | 21   | 27    | 14                      | 153  | 26    | 28                         | 31   | 10    | 29                      | 151  | 21    |      |      |       | 550        |  |
| Total                | 144                  | 80   | 142   | 28                      | 576  | 130   | 162                        | 111  | 38    | 111                     | 554  | 59    |      |      |       | 2135       |  |
| 05:00 PM             | 37                   | 29   | 51    | 7                       | 142  | 22    | 32                         | 21   | 11    | 41                      | 148  | 22    |      |      |       | 563        |  |
| 05:15 PM             | 33                   | 35   | 28    | 9                       | 139  | 31    | 28                         | 42   | 10    | 39                      | 164  | 16    |      |      |       | 574        |  |
| 05:30 PM             | 41                   | 23   | 25    | 16                      | 148  | 33    | 20                         | 28   | 9     | 41                      | 173  | 21    |      |      |       | 578        |  |
| 05:45 PM             | 35                   | 36   | 30    | 3                       | 125  | 25    | 28                         | 38   | 14    | 31                      | 161  | 27    |      |      |       | 553        |  |
| Total                | 146                  | 123  | 134   | 35                      | 554  | 111   | 108                        | 129  | 44    | 152                     | 646  | 86    |      |      |       | 2268       |  |
| Grand Total          | 290                  | 203  | 276   | 63                      | 1130 | 241   | 270                        | 240  | 82    | 263                     | 1200 | 145   |      |      |       | 4403       |  |
| Apprch %             | 37.7                 | 26.4 | 35.9  | 4.4                     | 78.8 | 16.8  | 45.6                       | 40.5 | 13.9  | 16.4                    | 74.6 | 9     |      |      |       |            |  |
| Total %              | 6.6                  | 4.6  | 6.3   | 1.4                     | 25.7 | 5.5   | 6.1                        | 5.5  | 1.9   | 6                       | 27.3 | 3.3   |      |      |       |            |  |



978-664-2565

File Name : 17640005  
Site Code : 17640005  
Start Date : 4/26/2017  
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File Name : 17640005  
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978-664-2565

File Name : 17640005  
Site Code : 17640005  
Start Date : 4/26/2017  
Page No : 10

File Name : 17640005  
Site Code : 17640005  
Start Date : 4/26/2017  
Page No : 10



Accurate Counts  
978-664-2565

N/S Street : Industrial Pl / Tower Rd  
E/W Street: Needham Street  
City/State : Newton, MA  
Weather : Rain

File Name : 17640006  
Site Code : 17640006  
Start Date : 4/26/2017  
Page No : 1

| Groups Printed- Cars - Trucks |                        |      |       |                         |      |       |                             |      |       |                         |      |       |            |
|-------------------------------|------------------------|------|-------|-------------------------|------|-------|-----------------------------|------|-------|-------------------------|------|-------|------------|
| Start Time                    | Tower Rd<br>From North |      |       | Needham St<br>From East |      |       | Industrial Pl<br>From South |      |       | Needham St<br>From West |      |       | Int. Total |
|                               | Left                   | Thru | Right | Left                    | Thru | Right | Left                        | Thru | Right | Left                    | Thru | Right |            |
| 07:00 AM                      | 1                      | 0    | 2     | 0                       | 85   | 0     | 1                           | 0    | 0     | 1                       | 198  | 5     | 293        |
| 07:15 AM                      | 1                      | 0    | 3     | 0                       | 148  | 2     | 1                           | 0    | 0     | 4                       | 173  | 5     | 337        |
| 07:30 AM                      | 0                      | 0    | 2     | 0                       | 176  | 3     | 1                           | 0    | 2     | 2                       | 181  | 6     | 373        |
| 07:45 AM                      | 2                      | 0    | 3     | 3                       | 148  | 3     | 1                           | 0    | 0     | 7                       | 189  | 2     | 358        |
| Total                         | 4                      | 0    | 10    | 3                       | 557  | 8     | 4                           | 0    | 2     | 14                      | 741  | 18    | 1361       |
| 08:00 AM                      | 0                      | 0    | 4     | 2                       | 186  | 2     | 1                           | 0    | 1     | 7                       | 174  | 3     | 380        |
| 08:15 AM                      | 1                      | 0    | 3     | 0                       | 176  | 3     | 0                           | 0    | 3     | 1                       | 173  | 1     | 361        |
| 08:30 AM                      | 1                      | 0    | 3     | 2                       | 158  | 7     | 2                           | 0    | 4     | 2                       | 135  | 5     | 319        |
| 08:45 AM                      | 3                      | 0    | 4     | 1                       | 191  | 7     | 1                           | 0    | 3     | 5                       | 169  | 5     | 389        |
| Total                         | 5                      | 0    | 14    | 5                       | 711  | 19    | 4                           | 0    | 11    | 15                      | 651  | 14    | 1449       |
| Grand Total                   | 9                      | 0    | 24    | 8                       | 1268 | 27    | 8                           | 0    | 13    | 29                      | 1392 | 32    | 2810       |
| Apprch %                      | 27.3                   | 0    | 72.7  | 0.6                     | 97.3 | 2.1   | 38.1                        | 0    | 61.9  | 2                       | 95.8 | 2.2   |            |
| Total %                       | 0.3                    | 0    | 0.9   | 0.3                     | 45.1 | 1     | 0.3                         | 0    | 0.5   | 1                       | 49.5 | 1.1   |            |
| Cars                          | 8                      | 0    | 24    | 8                       | 1233 | 26    | 6                           | 0    | 12    | 29                      | 1349 | 31    | 2726       |
| % Cars                        | 88.9                   | 0    | 100   | 100                     | 97.2 | 96.3  | 75                          | 0    | 92.3  | 100                     | 96.9 | 96.9  | 97         |
| Trucks                        | 1                      | 0    | 0     | 0                       | 35   | 1     | 2                           | 0    | 1     | 0                       | 43   | 1     | 84         |
| % Trucks                      | 11.1                   | 0    | 0     | 0                       | 2.8  | 3.7   | 25                          | 0    | 7.7   | 0                       | 3.1  | 3.1   | 3          |

Accurate Counts  
978-664-2565

N/S Street : Industrial Pl / Tower Rd  
E/W Street: Needham Street  
City/State : Newton, MA  
Weather : Rain

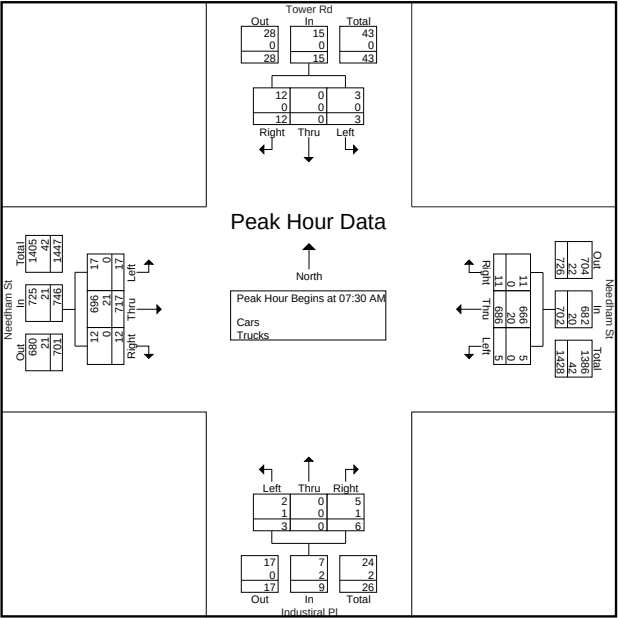
File Name : 17640006  
Site Code : 17640006  
Start Date : 4/26/2017  
Page No : 2

| Start Time   | Tower Rd<br>From North |      |       | Needham St<br>From East |      |       | Industrial Pl<br>From South |      |       | Needham St<br>From West |      |       | Int. Total |
|--------------|------------------------|------|-------|-------------------------|------|-------|-----------------------------|------|-------|-------------------------|------|-------|------------|
|              | Left                   | Thru | Right | Left                    | Thru | Right | Left                        | Thru | Right | Left                    | Thru | Right |            |
| 07:00 AM     | 1                      | 0    | 2     | 0                       | 176  | 3     | 1                           | 0    | 2     | 2                       | 181  | 6     | 373        |
| 07:15 AM     | 1                      | 0    | 3     | 3                       | 148  | 3     | 1                           | 0    | 0     | 7                       | 189  | 2     | 358        |
| 08:00 AM     | 0                      | 0    | 4     | 2                       | 186  | 2     | 1                           | 0    | 1     | 2                       | 174  | 3     | 184        |
| 08:15 AM     | 1                      | 0    | 3     | 4                       | 176  | 3     | 0                           | 0    | 3     | 1                       | 173  | 1     | 175        |
| Total Volume | 3                      | 0    | 12    | 5                       | 686  | 11    | 3                           | 0    | 6     | 9                       | 717  | 12    | 1472       |
| % App. Total | 20                     | 0    | 80    | 0.7                     | 97.7 | 1.6   | 33.3                        | 0    | 66.7  | 2.3                     | 96.1 | 1.6   |            |
| PHF          | .375                   | .000 | .750  | .417                    | .922 | .917  | .750                        | .000 | .500  | .607                    | .948 | .500  | .968       |
| Cars         | 3                      | 0    | 12    | 5                       | 666  | 11    | 2                           | 0    | 5     | 7                       | 696  | 12    | 1429       |
| % Cars       | 100                    | 0    | 100   | 100                     | 97.1 | 100   | 66.7                        | 0    | 83.3  | 100                     | 97.1 | 100   | 97.1       |
| Trucks       | 0                      | 0    | 0     | 0                       | 20   | 0     | 1                           | 0    | 1     | 0                       | 21   | 0     | 21         |
| % Trucks     | 0                      | 0    | 0     | 0                       | 2.9  | 0     | 33.3                        | 0    | 16.7  | 0                       | 2.9  | 0     | 2.9        |

Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1

Peak Hour for Entire Intersection Begins at 07:30 AM

|              |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |
|--------------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|
| 07:30 AM     | 0    | 0    | 2    | 2    | 0    | 176  | 3    | 179  | 1    | 0    | 2    | 3    | 2    | 181  | 6    | 189  | 373  |
| 07:45 AM     | 2    | 0    | 3    | 5    | 3    | 148  | 3    | 154  | 1    | 0    | 0    | 1    | 7    | 189  | 2    | 198  | 358  |
| 08:00 AM     | 0    | 0    | 4    | 4    | 2    | 186  | 2    | 190  | 1    | 0    | 1    | 2    | 7    | 174  | 3    | 184  | 380  |
| 08:15 AM     | 1    | 0    | 3    | 4    | 0    | 176  | 3    | 179  | 0    | 0    | 3    | 3    | 1    | 173  | 1    | 175  | 361  |
| Total Volume | 3    | 0    | 12   | 15   | 5    | 686  | 11   | 702  | 3    | 0    | 6    | 9    | 17   | 717  | 12   | 746  | 1472 |
| % App. Total | 20   | 0    | 80   |      | 0.7  | 97.7 | 1.6  |      | 33.3 | 0    | 66.7 |      | 2.3  | 96.1 | 1.6  |      |      |
| PHF          | .375 | .000 | .750 | .750 | .417 | .922 | .917 | .924 | .750 | .000 | .500 | .750 | .607 | .948 | .500 | .942 | .968 |
| Cars         | 3    | 0    | 12   | 15   | 5    | 666  | 11   | 682  | 2    | 0    | 5    | 7    | 17   | 696  | 12   | 725  | 1429 |
| % Cars       | 100  | 0    | 100  | 100  | 100  | 97.1 | 100  | 97.2 | 66.7 | 0    | 83.3 | 77.8 | 100  | 97.1 | 100  | 97.2 | 97.1 |
| Trucks       | 0    | 0    | 0    | 0    | 0    | 20   | 0    | 20   | 1    | 0    | 1    | 2    | 0    | 21   | 0    | 21   | 43   |
| % Trucks     | 0    | 0    | 0    | 0    | 0    | 2.9  | 0    | 2.8  | 33.3 | 0    | 16.7 | 22.2 | 0    | 2.9  | 0    | 2.8  | 2.9  |



# **Accurate Counts** 978-664-2565

N/S Street : Industrial Pl / Tower Rd  
E/W Street: Needham Street  
City/State : Newton, MA  
Weather : Rain

File Name : 17640006  
Site Code : 17640006  
Start Date : 4/26/2017  
Page No : 4

| Groups Printed- Cars |                        |      |       |                         |      |       |                             |      |       |                         |      |       |            |
|----------------------|------------------------|------|-------|-------------------------|------|-------|-----------------------------|------|-------|-------------------------|------|-------|------------|
|                      | Tower Rd<br>From North |      |       | Needham St<br>From East |      |       | Industrial Pl<br>From South |      |       | Needham St<br>From West |      |       |            |
| Start Time           | Left                   | Thru | Right | Left                    | Thru | Right | Left                        | Thru | Right | Left                    | Thru | Right | Int. Total |
| 07:00 AM             | 1                      | 0    | 2     | 0                       | 77   | 0     | 1                           | 0    | 0     | 1                       | 189  | 5     | 276        |
| 07:15 AM             | 1                      | 0    | 3     | 0                       | 145  | 2     | 1                           | 0    | 0     | 4                       | 168  | 4     | 328        |
| 07:30 AM             | 0                      | 0    | 2     | 0                       | 171  | 3     | 1                           | 0    | 1     | 2                       | 177  | 6     | 363        |
| 07:45 AM             | 2                      | 0    | 3     | 3                       | 143  | 3     | 1                           | 0    | 0     | 7                       | 182  | 2     | 346        |
| Total                | 4                      | 0    | 10    | 3                       | 536  | 8     | 4                           | 0    | 1     | 14                      | 716  | 17    | 1313       |
| 08:00 AM             | 0                      | 0    | 4     | 2                       | 182  | 2     | 0                           | 0    | 1     | 7                       | 168  | 3     | 369        |
| 08:15 AM             | 1                      | 0    | 3     | 0                       | 170  | 3     | 0                           | 0    | 3     | 1                       | 169  | 1     | 351        |
| 08:30 AM             | 1                      | 0    | 3     | 2                       | 156  | 6     | 2                           | 0    | 4     | 2                       | 132  | 5     | 313        |
| 08:45 AM             | 2                      | 0    | 4     | 1                       | 189  | 7     | 0                           | 0    | 3     | 5                       | 164  | 5     | 380        |
| Total                | 4                      | 0    | 14    | 5                       | 697  | 18    | 2                           | 0    | 11    | 15                      | 633  | 14    | 1413       |
| Grand Total          | 8                      | 0    | 24    | 8                       | 1233 | 26    | 6                           | 0    | 12    | 29                      | 1349 | 31    | 2726       |
| Apprch %             | 25                     | 0    | 75    | 0.6                     | 97.3 | 2.1   | 33.3                        | 0    | 66.7  | 2.1                     | 95.7 | 2.2   |            |
| Total %              | 0.3                    | 0    | 0.9   | 0.3                     | 45.2 | 1     | 0.2                         | 0    | 0.4   | 1.1                     | 49.5 | 1.1   |            |

# **Accurate Counts** 978-664-2565

N/S Street : Industrial Pl / Tower Rd  
E/W Street: Needham Street  
City/State : Newton, MA  
Weather : Rain

File Name : 17640006  
Site Code : 17640006  
Start Date : 4/26/2017  
Page No : 7

| Groups Printed- Trucks |                        |      |       |                         |      |       |                             |      |       |                         |      |       |            |
|------------------------|------------------------|------|-------|-------------------------|------|-------|-----------------------------|------|-------|-------------------------|------|-------|------------|
|                        | Tower Rd<br>From North |      |       | Needham St<br>From East |      |       | Industrial Pl<br>From South |      |       | Needham St<br>From West |      |       |            |
| Start Time             | Left                   | Thru | Right | Left                    | Thru | Right | Left                        | Thru | Right | Left                    | Thru | Right | Int. Total |
| 07:00 AM               | 0                      | 0    | 0     | 0                       | 8    | 0     | 0                           | 0    | 0     | 0                       | 9    | 0     | 17         |
| 07:15 AM               | 0                      | 0    | 0     | 0                       | 3    | 0     | 0                           | 0    | 0     | 0                       | 5    | 1     | 9          |
| 07:30 AM               | 0                      | 0    | 0     | 0                       | 5    | 0     | 0                           | 0    | 1     | 0                       | 4    | 0     | 10         |
| 07:45 AM               | 0                      | 0    | 0     | 0                       | 5    | 0     | 0                           | 0    | 0     | 0                       | 7    | 0     | 12         |
| Total                  | 0                      | 0    | 0     | 0                       | 21   | 0     | 0                           | 0    | 1     | 0                       | 25   | 1     | 48         |
| 08:00 AM               | 0                      | 0    | 0     | 0                       | 4    | 0     | 1                           | 0    | 0     | 0                       | 6    | 0     | 11         |
| 08:15 AM               | 0                      | 0    | 0     | 0                       | 6    | 0     | 0                           | 0    | 0     | 0                       | 4    | 0     | 10         |
| 08:30 AM               | 0                      | 0    | 0     | 0                       | 2    | 1     | 0                           | 0    | 0     | 0                       | 3    | 0     | 6          |
| 08:45 AM               | 1                      | 0    | 0     | 0                       | 2    | 0     | 1                           | 0    | 0     | 0                       | 5    | 0     | 9          |
| Total                  | 1                      | 0    | 0     | 0                       | 14   | 1     | 2                           | 0    | 0     | 0                       | 18   | 0     | 36         |
| Grand Total            | 1                      | 0    | 0     | 0                       | 35   | 1     | 2                           | 0    | 1     | 0                       | 43   | 1     | 84         |
| Apprch %               | 100                    | 0    | 0     | 0                       | 97.2 | 2.8   | 66.7                        | 0    | 33.3  | 0                       | 97.7 | 2.3   |            |
| Total %                | 1.2                    | 0    | 0     | 0                       | 41.7 | 1.2   | 2.4                         | 0    | 1.2   | 0                       | 51.2 | 1.2   |            |

**Accurate Counts**  
978-664-2565

N/S Street : Industrial Pl / Tower Rd  
E/W Street: Needham Street  
City/State : Newton, MA  
Weather : Rain

File Name : 17640006  
Site Code : 17640006  
Start Date : 4/26/2017  
Page No : 10

| Groups Printed- Bikes, Peds |                        |      |       |      |                         |      |       |      |                             |      |       |      |                         |      |       |      |              |              |            |    |
|-----------------------------|------------------------|------|-------|------|-------------------------|------|-------|------|-----------------------------|------|-------|------|-------------------------|------|-------|------|--------------|--------------|------------|----|
|                             | Tower Rd<br>From North |      |       |      | Needham St<br>From East |      |       |      | Industrial Pl<br>From South |      |       |      | Needham St<br>From West |      |       |      |              |              |            |    |
| Start Time                  | Left                   | Thru | Right | Peds | Left                    | Thru | Right | Peds | Left                        | Thru | Right | Peds | Left                    | Thru | Right | Peds | Exclu. Total | Inclu. Total | Int. Total |    |
| 07:00 AM                    | 0                      | 0    | 0     | 0    | 0                       | 0    | 0     | 0    | 0                           | 0    | 0     | 0    | 2                       | 0    | 0     | 0    | 0            | 2            | 0          | 2  |
| 07:15 AM                    | 0                      | 0    | 0     | 1    | 0                       | 0    | 0     | 0    | 0                           | 0    | 0     | 0    | 1                       | 0    | 0     | 0    | 0            | 2            | 0          | 2  |
| 07:30 AM                    | 0                      | 0    | 0     | 0    | 0                       | 0    | 0     | 0    | 0                           | 0    | 0     | 0    | 0                       | 0    | 0     | 0    | 0            | 0            | 0          | 0  |
| 07:45 AM                    | 0                      | 0    | 0     | 0    | 0                       | 0    | 0     | 0    | 0                           | 0    | 0     | 0    | 0                       | 0    | 0     | 0    | 0            | 0            | 0          | 0  |
| Total                       | 0                      | 0    | 0     | 1    | 0                       | 0    | 0     | 0    | 0                           | 0    | 0     | 0    | 3                       | 0    | 0     | 0    | 0            | 4            | 0          | 4  |
| 08:00 AM                    | 0                      | 0    | 0     | 0    | 0                       | 0    | 0     | 0    | 0                           | 0    | 0     | 0    | 0                       | 0    | 0     | 0    | 0            | 0            | 0          | 0  |
| 08:15 AM                    | 0                      | 0    | 0     | 3    | 0                       | 0    | 0     | 0    | 0                           | 0    | 0     | 0    | 0                       | 0    | 1     | 0    | 1            | 4            | 1          | 5  |
| 08:30 AM                    | 0                      | 0    | 0     | 1    | 0                       | 0    | 0     | 0    | 0                           | 0    | 0     | 0    | 0                       | 0    | 0     | 0    | 0            | 1            | 0          | 1  |
| 08:45 AM                    | 0                      | 0    | 0     | 0    | 0                       | 0    | 0     | 0    | 0                           | 0    | 0     | 0    | 2                       | 0    | 0     | 0    | 0            | 2            | 0          | 2  |
| Total                       | 0                      | 0    | 0     | 4    | 0                       | 0    | 0     | 0    | 0                           | 0    | 0     | 0    | 2                       | 0    | 1     | 0    | 1            | 7            | 1          | 8  |
| Grand Total                 | 0                      | 0    | 0     | 5    | 0                       | 0    | 0     | 0    | 0                           | 0    | 0     | 0    | 5                       | 0    | 1     | 0    | 1            | 11           | 1          | 12 |
| Apprch %                    | 0                      | 0    | 0     |      | 0                       | 0    | 0     |      | 0                           | 0    | 0     |      | 0                       | 100  | 0     |      |              |              |            |    |
| Total %                     | 0                      | 0    | 0     |      | 0                       | 0    | 0     |      | 0                           | 0    | 0     |      | 0                       | 100  | 0     |      | 91.7         | 8.3          |            |    |

**Accurate Counts**  
978-664-2565

N/S Street : Industrial Pl / Tower Rd  
E/W Street: Needham Street  
City/State : Newton, MA  
Weather : Rain

File Name : 17640006  
Site Code : 17640006  
Start Date : 4/26/2017  
Page No : 1

| Groups Printed- Cars - Trucks |                        |      |       |                         |      |       |                             |      |       |                         |      |       |
|-------------------------------|------------------------|------|-------|-------------------------|------|-------|-----------------------------|------|-------|-------------------------|------|-------|
|                               | Tower Rd<br>From North |      |       | Needham St<br>From East |      |       | Industrial Pl<br>From South |      |       | Needham St<br>From West |      |       |
| Start Time                    | Left                   | Thru | Right | Left                    | Thru | Right | Left                        | Thru | Right | Left                    | Thru | Right |
| 04:00 PM                      | 15                     | 1    | 18    | 1                       | 114  | 12    | 10                          | 2    | 15    | 13                      | 154  | 7     |
| 04:15 PM                      | 9                      | 2    | 21    | 3                       | 126  | 8     | 10                          | 1    | 10    | 18                      | 135  | 6     |
| 04:30 PM                      | 13                     | 1    | 16    | 4                       | 135  | 16    | 14                          | 1    | 10    | 16                      | 146  | 14    |
| 04:45 PM                      | 23                     | 0    | 20    | 7                       | 129  | 14    | 21                          | 2    | 6     | 11                      | 147  | 11    |
| Total                         | 60                     | 4    | 75    | 15                      | 504  | 50    | 55                          | 6    | 41    | 58                      | 582  | 38    |
| 05:00 PM                      | 13                     | 1    | 25    | 2                       | 128  | 8     | 15                          | 1    | 11    | 14                      | 185  | 8     |
| 05:15 PM                      | 14                     | 2    | 15    | 5                       | 125  | 19    | 15                          | 0    | 18    | 23                      | 184  | 6     |
| 05:30 PM                      | 5                      | 1    | 21    | 3                       | 120  | 14    | 5                           | 4    | 14    | 20                      | 188  | 10    |
| 05:45 PM                      | 13                     | 0    | 19    | 3                       | 129  | 9     | 8                           | 2    | 8     | 25                      | 173  | 7     |
| Total                         | 45                     | 4    | 80    | 13                      | 502  | 50    | 43                          | 7    | 51    | 82                      | 730  | 31    |
| Grand Total                   | 105                    | 8    | 155   | 28                      | 1006 | 100   | 98                          | 13   | 92    | 140                     | 1312 | 69    |
| Apprch %                      | 39.2                   | 3    | 57.8  | 2.5                     | 88.7 | 8.8   | 48.3                        | 6.4  | 45.3  | 9.2                     | 86.3 | 4.5   |
| Total %                       | 3.4                    | 0.3  | 5     | 0.9                     | 32.2 | 3.2   | 3.1                         | 0.4  | 2.9   | 4.5                     | 42   | 2.2   |
| Cars                          | 105                    | 8    | 152   | 28                      | 997  | 100   | 96                          | 13   | 91    | 140                     | 1307 | 68    |
| % Cars                        | 100                    | 100  | 98.1  | 100                     | 99.1 | 100   | 98                          | 100  | 98.9  | 100                     | 99.6 | 98.6  |
| Trucks                        | 0                      | 0    | 3     | 0                       | 9    | 0     | 2                           | 0    | 1     | 0                       | 5    | 1     |
| % Trucks                      | 0                      | 0    | 1.9   | 0                       | 0.9  | 0     | 2                           | 0    | 1.1   | 0                       | 0.4  | 1.4   |

Accurate Counts  
978-664-2565

N/S Street : Industrial Pl / Tower Rd  
E/W Street: Needham Street  
City/State : Newton, MA  
Weather : Rain

File Name : 17640006  
Site Code : 17640006  
Start Date : 4/26/2017  
Page No : 2

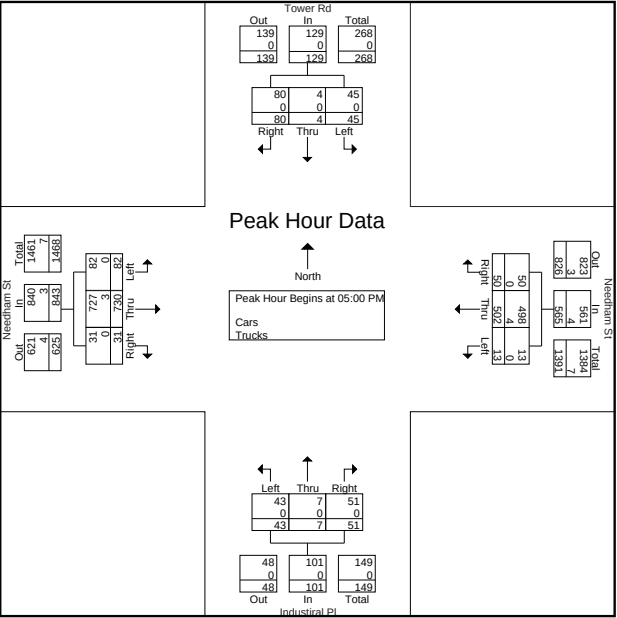
|                                                            | Tower Rd<br>From North |      |       |            | Needham St<br>From East |      |       |            | Industrial Pl<br>From South |      |       |            | Needham St<br>From West |      |       |            |            |
|------------------------------------------------------------|------------------------|------|-------|------------|-------------------------|------|-------|------------|-----------------------------|------|-------|------------|-------------------------|------|-------|------------|------------|
| Start Time                                                 | Left                   | Thru | Right | App. Total | Left                    | Thru | Right | App. Total | Left                        | Thru | Right | App. Total | Left                    | Thru | Right | App. Total | Int. Total |
| Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1 |                        |      |       |            |                         |      |       |            |                             |      |       |            |                         |      |       |            |            |
| Peak Hour for Entire Intersection Begins at 05:00 PM       |                        |      |       |            |                         |      |       |            |                             |      |       |            |                         |      |       |            |            |
| 05:00 PM                                                   | 13                     | 1    | 25    | 39         | 2                       | 128  | 8     | 138        | 15                          | 1    | 11    | 27         | 14                      | 185  | 8     | 207        | 411        |
| 05:15 PM                                                   | 14                     | 2    | 15    | 31         | 5                       | 125  | 19    | 149        | 15                          | 0    | 18    | 33         | 23                      | 184  | 6     | 213        | 426        |
| 05:30 PM                                                   | 5                      | 1    | 21    | 27         | 3                       | 120  | 14    | 137        | 5                           | 4    | 14    | 23         | 20                      | 188  | 10    | 218        | 405        |
| 05:45 PM                                                   | 13                     | 0    | 19    | 32         | 3                       | 129  | 9     | 141        | 8                           | 2    | 8     | 18         | 25                      | 173  | 7     | 205        | 396        |
| Total Volume                                               | 45                     | 4    | 80    | 129        | 13                      | 502  | 50    | 565        | 43                          | 7    | 51    | 101        | 82                      | 730  | 31    | 843        | 1638       |
| % App. Total                                               | 34.9                   | 3.1  | 62    |            | 2.3                     | 88.8 | 8.8   |            | 42.6                        | 6.9  | 50.5  |            | 9.7                     | 86.6 | 3.7   |            |            |
| PHF                                                        | .804                   | .500 | .800  | .827       | .650                    | .973 | .658  | .948       | .717                        | .438 | .708  | .765       | .820                    | .971 | .775  | .967       | .961       |
| Cars                                                       | 45                     | 4    | 80    | 129        | 13                      | 498  | 50    | 561        | 43                          | 7    | 51    | 101        | 82                      | 727  | 31    | 840        | 1631       |
| % Cars                                                     | 100                    | 100  | 100   | 100        | 100                     | 99.2 | 100   | 99.3       | 100                         | 100  | 100   | 100        | 100                     | 99.6 | 100   | 99.6       | 99.6       |
| Trucks                                                     | 0                      | 0    | 0     | 0          | 0                       | 4    | 0     | 4          | 0                           | 0    | 0     | 0          | 0                       | 3    | 0     | 3          | 7          |
| % Trucks                                                   | 0                      | 0    | 0     | 0          | 0                       | 0.8  | 0     | 0.7        | 0                           | 0    | 0     | 0          | 0                       | 0.4  | 0     | 0.4        | 0.4        |

Accurate Counts  
978-664-2565

N/S Street : Industrial Pl / Tower Rd  
E/W Street: Needham Street  
City/State : Newton, MA  
Weather : Rain

File Name : 17640006  
Site Code : 17640006  
Start Date : 4/26/2017  
Page No : 4

| Groups Printed- Cars |                        |      |       |                         |      |       |                             |      |       |                         |      |       |            |  |
|----------------------|------------------------|------|-------|-------------------------|------|-------|-----------------------------|------|-------|-------------------------|------|-------|------------|--|
|                      | Tower Rd<br>From North |      |       | Needham St<br>From East |      |       | Industrial Pl<br>From South |      |       | Needham St<br>From West |      |       |            |  |
| Start Time           | Left                   | Thru | Right | Left                    | Thru | Right | Left                        | Thru | Right | Left                    | Thru | Right | Int. Total |  |
| 04:00 PM             | 15                     | 1    | 16    | 1                       | 113  | 12    | 10                          | 2    | 14    | 13                      | 153  | 7     | 357        |  |
| 04:15 PM             | 9                      | 2    | 21    | 3                       | 123  | 8     | 9                           | 1    | 10    | 18                      | 134  | 5     | 343        |  |
| 04:30 PM             | 13                     | 1    | 15    | 4                       | 135  | 16    | 14                          | 1    | 10    | 16                      | 146  | 14    | 385        |  |
| 04:45 PM             | 23                     | 0    | 20    | 7                       | 128  | 14    | 20                          | 2    | 6     | 11                      | 147  | 11    | 389        |  |
| Total                | 60                     | 4    | 72    | 15                      | 499  | 50    | 53                          | 6    | 40    | 58                      | 580  | 37    | 1474       |  |
| 05:00 PM             | 13                     | 1    | 25    | 2                       | 125  | 8     | 15                          | 1    | 11    | 14                      | 183  | 8     | 406        |  |
| 05:15 PM             | 14                     | 2    | 15    | 5                       | 124  | 19    | 15                          | 0    | 18    | 23                      | 184  | 6     | 425        |  |
| 05:30 PM             | 5                      | 1    | 21    | 3                       | 120  | 14    | 5                           | 4    | 14    | 20                      | 188  | 10    | 405        |  |
| 05:45 PM             | 13                     | 0    | 19    | 3                       | 129  | 9     | 8                           | 2    | 8     | 25                      | 172  | 7     | 395        |  |
| Total                | 45                     | 4    | 80    | 13                      | 498  | 50    | 43                          | 7    | 51    | 82                      | 727  | 31    | 1631       |  |
| Grand Total          | 105                    | 8    | 152   | 28                      | 997  | 100   | 96                          | 13   | 91    | 140                     | 1307 | 68    | 3105       |  |
| Apprch %             | 39.6                   | 3    | 57.4  | 2.5                     | 88.6 | 8.9   | 48                          | 6.5  | 45.5  | 9.2                     | 86.3 | 4.5   |            |  |
| Total %              | 3.4                    | 0.3  | 4.9   | 0.9                     | 32.1 | 3.2   | 3.1                         | 0.4  | 2.9   | 4.5                     | 42.1 | 2.2   |            |  |



**Accurate Counts**  
978-664-2565

N/S Street : Industrial Pl / Tower Rd  
E/W Street: Needham Street  
City/State : Newton, MA  
Weather : Rain

File Name : 17640006  
Site Code : 17640006  
Start Date : 4/26/2017  
Page No : 7

| Groups Printed- Trucks |                        |      |       |                         |      |       |                             |      |       |                         |      |       |            |
|------------------------|------------------------|------|-------|-------------------------|------|-------|-----------------------------|------|-------|-------------------------|------|-------|------------|
|                        | Tower Rd<br>From North |      |       | Needham St<br>From East |      |       | Industrial Pl<br>From South |      |       | Needham St<br>From West |      |       | Int. Total |
| Start Time             | Left                   | Thru | Right | Left                    | Thru | Right | Left                        | Thru | Right | Left                    | Thru | Right |            |
| 04:00 PM               | 0                      | 0    | 2     | 0                       | 1    | 0     | 0                           | 0    | 1     | 0                       | 1    | 0     | 5          |
| 04:15 PM               | 0                      | 0    | 0     | 0                       | 3    | 0     | 1                           | 0    | 0     | 0                       | 1    | 1     | 6          |
| 04:30 PM               | 0                      | 0    | 1     | 0                       | 0    | 0     | 0                           | 0    | 0     | 0                       | 0    | 0     | 1          |
| 04:45 PM               | 0                      | 0    | 0     | 0                       | 1    | 0     | 1                           | 0    | 0     | 0                       | 0    | 0     | 2          |
| Total                  | 0                      | 0    | 3     | 0                       | 5    | 0     | 2                           | 0    | 1     | 0                       | 2    | 1     | 14         |
| 05:00 PM               | 0                      | 0    | 0     | 0                       | 3    | 0     | 0                           | 0    | 0     | 0                       | 2    | 0     | 5          |
| 05:15 PM               | 0                      | 0    | 0     | 0                       | 1    | 0     | 0                           | 0    | 0     | 0                       | 0    | 0     | 1          |
| 05:30 PM               | 0                      | 0    | 0     | 0                       | 0    | 0     | 0                           | 0    | 0     | 0                       | 0    | 0     | 0          |
| 05:45 PM               | 0                      | 0    | 0     | 0                       | 0    | 0     | 0                           | 0    | 0     | 0                       | 1    | 0     | 1          |
| Total                  | 0                      | 0    | 0     | 0                       | 4    | 0     | 0                           | 0    | 0     | 0                       | 3    | 0     | 7          |
| Grand Total            | 0                      | 0    | 3     | 0                       | 9    | 0     | 2                           | 0    | 1     | 0                       | 5    | 1     | 21         |
| Apprch %               | 0                      | 0    | 100   | 0                       | 100  | 0     | 66.7                        | 0    | 33.3  | 0                       | 83.3 | 16.7  |            |
| Total %                | 0                      | 0    | 14.3  | 0                       | 42.9 | 0     | 9.5                         | 0    | 4.8   | 0                       | 23.8 | 4.8   |            |

**Accurate Counts**  
978-664-2565

N/S Street : Industrial Pl / Tower Rd  
E/W Street: Needham Street  
City/State : Newton, MA  
Weather : Rain

File Name : 17640006  
Site Code : 17640006  
Start Date : 4/26/2017  
Page No : 10

| Groups Printed- Bikes, Peds |                        |      |       |      |                         |      |       |      |                             |      |       |      |                         |      |       |      |              |
|-----------------------------|------------------------|------|-------|------|-------------------------|------|-------|------|-----------------------------|------|-------|------|-------------------------|------|-------|------|--------------|
|                             | Tower Rd<br>From North |      |       |      | Needham St<br>From East |      |       |      | Industrial Pl<br>From South |      |       |      | Needham St<br>From West |      |       |      |              |
| Start Time                  | Left                   | Thru | Right | Peds | Left                    | Thru | Right | Peds | Left                        | Thru | Right | Peds | Left                    | Thru | Right | Peds | Exclu. Total |
| 04:00 PM                    | 0                      | 0    | 0     | 1    | 0                       | 0    | 0     | 0    | 0                           | 0    | 0     | 3    | 0                       | 0    | 0     | 0    | 4            |
| 04:15 PM                    | 0                      | 0    | 0     | 1    | 0                       | 0    | 0     | 0    | 0                           | 0    | 0     | 1    | 0                       | 1    | 0     | 2    | 4            |
| 04:30 PM                    | 0                      | 0    | 0     | 0    | 0                       | 0    | 0     | 0    | 0                           | 0    | 0     | 0    | 0                       | 0    | 0     | 2    | 2            |
| 04:45 PM                    | 0                      | 0    | 0     | 4    | 0                       | 0    | 0     | 0    | 0                           | 0    | 0     | 1    | 0                       | 1    | 0     | 5    | 10           |
| Total                       | 0                      | 0    | 0     | 6    | 0                       | 0    | 0     | 0    | 0                           | 0    | 0     | 5    | 0                       | 2    | 0     | 9    | 20           |
| 05:00 PM                    | 0                      | 0    | 0     | 2    | 0                       | 0    | 0     | 0    | 0                           | 0    | 0     | 0    | 0                       | 0    | 0     | 1    | 3            |
| 05:15 PM                    | 0                      | 0    | 0     | 3    | 0                       | 0    | 0     | 0    | 0                           | 0    | 0     | 1    | 0                       | 0    | 0     | 0    | 4            |
| 05:30 PM                    | 0                      | 0    | 0     | 0    | 0                       | 0    | 0     | 0    | 0                           | 0    | 0     | 2    | 0                       | 0    | 0     | 0    | 2            |
| 05:45 PM                    | 0                      | 0    | 0     | 1    | 0                       | 0    | 0     | 0    | 0                           | 0    | 0     | 1    | 0                       | 0    | 0     | 0    | 2            |
| Total                       | 0                      | 0    | 0     | 6    | 0                       | 0    | 0     | 0    | 0                           | 0    | 0     | 4    | 0                       | 0    | 0     | 1    | 11           |
| Grand Total                 | 0                      | 0    | 0     | 12   | 0                       | 0    | 0     | 0    | 0                           | 0    | 0     | 9    | 0                       | 2    | 0     | 10   | 31           |
| Apprch %                    | 0                      | 0    | 0     |      | 0                       | 0    | 0     |      | 0                           | 0    | 0     |      | 0                       | 100  | 0     |      |              |
| Total %                     | 0                      | 0    | 0     |      | 0                       | 0    | 0     |      | 0                           | 0    | 0     |      | 0                       | 100  | 0     |      | 93.9         |

# Accurate Counts 978-664-2565

N/S Street : Columbia Ave / Avalon Drwy  
E/W Street: Needham Street  
City/State : Newton, MA  
Weather : Rain

File Name : 17640007  
Site Code : 17640007  
Start Date : 4/26/2017  
Page No : 1

| Groups Printed- Cars - Trucks |                           |      |       |                         |      |       |                            |      |       |                         |      |       |            |  |
|-------------------------------|---------------------------|------|-------|-------------------------|------|-------|----------------------------|------|-------|-------------------------|------|-------|------------|--|
|                               | Avalon Drwy<br>From North |      |       | Needham St<br>From East |      |       | Columbia Ave<br>From South |      |       | Needham St<br>From West |      |       |            |  |
| Start Time                    | Left                      | Thru | Right | Left                    | Thru | Right | Left                       | Thru | Right | Left                    | Thru | Right | Int. Total |  |
| 07:00 AM                      | 5                         | 0    | 2     | 0                       | 102  | 0     | 0                          | 0    | 2     | 0                       | 191  | 0     | 302        |  |
| 07:15 AM                      | 6                         | 0    | 6     | 0                       | 152  | 2     | 1                          | 0    | 0     | 2                       | 177  | 0     | 346        |  |
| 07:30 AM                      | 2                         | 0    | 7     | 0                       | 169  | 1     | 4                          | 0    | 1     | 1                       | 167  | 0     | 352        |  |
| 07:45 AM                      | 3                         | 0    | 4     | 0                       | 153  | 3     | 4                          | 1    | 1     | 2                       | 195  | 0     | 366        |  |
| Total                         | 16                        | 0    | 19    | 0                       | 576  | 6     | 9                          | 1    | 4     | 5                       | 730  | 0     | 1366       |  |
| 08:00 AM                      | 14                        | 0    | 3     | 0                       | 175  | 3     | 2                          | 1    | 4     | 7                       | 160  | 1     | 370        |  |
| 08:15 AM                      | 1                         | 0    | 6     | 0                       | 178  | 3     | 6                          | 2    | 3     | 1                       | 165  | 0     | 365        |  |
| 08:30 AM                      | 8                         | 0    | 11    | 0                       | 178  | 6     | 2                          | 2    | 4     | 2                       | 148  | 0     | 361        |  |
| 08:45 AM                      | 3                         | 0    | 5     | 1                       | 202  | 2     | 3                          | 1    | 2     | 3                       | 153  | 0     | 375        |  |
| Total                         | 26                        | 0    | 25    | 1                       | 733  | 14    | 13                         | 6    | 13    | 13                      | 626  | 1     | 1471       |  |
| Grand Total                   | 42                        | 0    | 44    | 1                       | 1309 | 20    | 22                         | 7    | 17    | 18                      | 1356 | 1     | 2837       |  |
| Apprch %                      | 48.8                      | 0    | 51.2  | 0.1                     | 98.4 | 1.5   | 47.8                       | 15.2 | 37    | 1.3                     | 98.6 | 0.1   |            |  |
| Total %                       | 1.5                       | 0    | 1.6   | 0                       | 46.1 | 0.7   | 0.8                        | 0.2  | 0.6   | 0.6                     | 47.8 | 0     |            |  |
| Cars                          | 37                        | 0    | 43    | 1                       | 1279 | 19    | 22                         | 6    | 17    | 15                      | 1310 | 1     | 2750       |  |
| % Cars                        | 88.1                      | 0    | 97.7  | 100                     | 97.7 | 95    | 100                        | 85.7 | 100   | 83.3                    | 96.6 | 100   | 96.9       |  |
| Trucks                        | 5                         | 0    | 1     | 0                       | 30   | 1     | 0                          | 1    | 0     | 3                       | 46   | 0     | 87         |  |
| % Trucks                      | 11.9                      | 0    | 2.3   | 0                       | 2.3  | 5     | 0                          | 14.3 | 0     | 16.7                    | 3.4  | 0     | 3.1        |  |

# Accurate Counts 978-664-2565

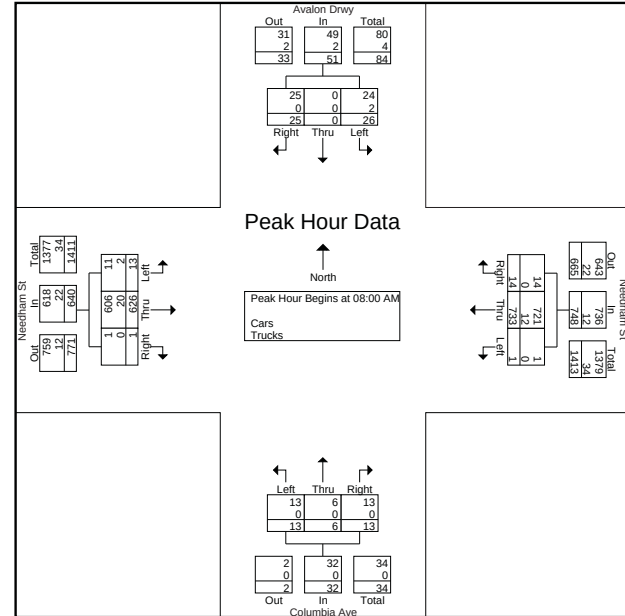
N/S Street : Columbia Ave / Avalon Drwy  
E/W Street: Needham Street  
City/State : Newton, MA  
Weather : Rain

File Name : 17640007  
Site Code : 17640007  
Start Date : 4/26/2017  
Page No : 2

| Start Time   | Avalon Drwy<br>From North |      |       |            | Needham St<br>From East |      |       |            | Columbia Ave<br>From South |      |       |            | Needham St<br>From West |      |       |            | Int. Total |
|--------------|---------------------------|------|-------|------------|-------------------------|------|-------|------------|----------------------------|------|-------|------------|-------------------------|------|-------|------------|------------|
|              | Left                      | Thru | Right | App. Total | Left                    | Thru | Right | App. Total | Left                       | Thru | Right | App. Total | Left                    | Thru | Right | App. Total |            |
| 07:00 AM     | 5                         | 0    | 2     | 7          | 0                       | 175  | 3     | 178        | 2                          | 1    | 4     | 7          | 7                       | 160  | 1     | 168        | 370        |
| 07:15 AM     | 6                         | 0    | 6     | 12         | 0                       | 178  | 3     | 181        | 6                          | 2    | 3     | 11         | 1                       | 165  | 0     | 166        | 365        |
| 07:30 AM     | 2                         | 0    | 7     | 9          | 0                       | 178  | 6     | 184        | 2                          | 2    | 4     | 8          | 2                       | 148  | 0     | 150        | 361        |
| 07:45 AM     | 3                         | 0    | 5     | 8          | 1                       | 202  | 2     | 205        | 3                          | 1    | 2     | 6          | 3                       | 153  | 0     | 156        | 375        |
| Total Volume | 26                        | 0    | 25    | 51         | 1                       | 733  | 14    | 748        | 13                         | 6    | 13    | 32         | 13                      | 626  | 1     | 640        | 1471       |
| % App. Total | 51                        | 0    | 49    |            | 0.1                     | 98   | 1.9   |            | 40.6                       | 18.8 | 40.6  |            | 2                       | 97.8 | 0.2   |            |            |
| PHF          | .464                      | .000 | .568  | .671       | .250                    | .907 | .583  | .912       | .542                       | .750 | .813  | .727       | .464                    | .948 | .250  | .952       | .981       |
| Cars         | 24                        | 0    | 25    | 49         | 1                       | 721  | 14    | 736        | 13                         | 6    | 13    | 32         | 11                      | 606  | 1     | 618        | 1435       |
| % Cars       | 92.3                      | 0    | 100   | 96.1       | 100                     | 98.4 | 100   | 98.4       | 100                        | 100  | 100   | 100        | 84.6                    | 96.8 | 100   | 96.6       | 97.6       |
| Trucks       | 2                         | 0    | 0     | 2          | 0                       | 12   | 0     | 12         | 0                          | 0    | 0     | 0          | 2                       | 20   | 0     | 22         | 36         |
| % Trucks     | 7.7                       | 0    | 0     | 3.9        | 0                       | 1.6  | 0     | 1.6        | 0                          | 0    | 0     | 0          | 15.4                    | 3.2  | 0     | 3.4        | 2.4        |

Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1

Peak Hour for Entire Intersection Begins at 08:00 AM



**Accurate Counts**  
978-664-2565

N/S Street : Columbia Ave / Avalon Drwy  
E/W Street: Needham Street  
City/State : Newton, MA  
Weather : Rain

File Name : 17640007  
Site Code : 17640007  
Start Date : 4/26/2017  
Page No : 4

| Groups Printed- Cars |                           |      |       |                         |      |       |                            |      |       |                         |      |       |            |
|----------------------|---------------------------|------|-------|-------------------------|------|-------|----------------------------|------|-------|-------------------------|------|-------|------------|
| Start Time           | Avalon Drwy<br>From North |      |       | Needham St<br>From East |      |       | Columbia Ave<br>From South |      |       | Needham St<br>From West |      |       | Int. Total |
|                      | Left                      | Thru | Right | Left                    | Thru | Right | Left                       | Thru | Right | Left                    | Thru | Right |            |
| 07:00 AM             | 4                         | 0    | 2     | 0                       | 93   | 0     | 0                          | 0    | 2     | 0                       | 183  | 0     | 284        |
| 07:15 AM             | 5                         | 0    | 6     | 0                       | 150  | 1     | 1                          | 0    | 0     | 2                       | 171  | 0     | 336        |
| 07:30 AM             | 2                         | 0    | 7     | 0                       | 164  | 1     | 4                          | 0    | 1     | 0                       | 162  | 0     | 341        |
| 07:45 AM             | 2                         | 0    | 3     | 0                       | 151  | 3     | 4                          | 0    | 1     | 2                       | 188  | 0     | 354        |
| Total                | 13                        | 0    | 18    | 0                       | 558  | 5     | 9                          | 0    | 4     | 4                       | 704  | 0     | 1315       |
| 08:00 AM             | 12                        | 0    | 3     | 0                       | 171  | 3     | 2                          | 1    | 4     | 5                       | 155  | 1     | 357        |
| 08:15 AM             | 1                         | 0    | 6     | 0                       | 173  | 3     | 6                          | 2    | 3     | 1                       | 163  | 0     | 358        |
| 08:30 AM             | 8                         | 0    | 11    | 0                       | 176  | 6     | 2                          | 2    | 4     | 2                       | 144  | 0     | 355        |
| 08:45 AM             | 3                         | 0    | 5     | 1                       | 201  | 2     | 3                          | 1    | 2     | 3                       | 144  | 0     | 365        |
| Total                | 24                        | 0    | 25    | 1                       | 721  | 14    | 13                         | 6    | 13    | 11                      | 606  | 1     | 1435       |
| Grand Total          | 37                        | 0    | 43    | 1                       | 1279 | 19    | 22                         | 6    | 17    | 15                      | 1310 | 1     | 2750       |
| Apprch %             | 46.2                      | 0    | 53.8  | 0.1                     | 98.5 | 1.5   | 48.9                       | 13.3 | 37.8  | 1.1                     | 98.8 | 0.1   |            |
| Total %              | 1.3                       | 0    | 1.6   | 0                       | 46.5 | 0.7   | 0.8                        | 0.2  | 0.6   | 0.5                     | 47.6 | 0     |            |

**Accurate Counts**  
978-664-2565

N/S Street : Columbia Ave / Avalon Drwy  
E/W Street: Needham Street  
City/State : Newton, MA  
Weather : Rain

File Name : 17640007  
Site Code : 17640007  
Start Date : 4/26/2017  
Page No : 7

| Groups Printed- Trucks |                           |      |       |                         |      |       |                            |      |       |                         |      |       |            |
|------------------------|---------------------------|------|-------|-------------------------|------|-------|----------------------------|------|-------|-------------------------|------|-------|------------|
| Start Time             | Avalon Drwy<br>From North |      |       | Needham St<br>From East |      |       | Columbia Ave<br>From South |      |       | Needham St<br>From West |      |       | Int. Total |
|                        | Left                      | Thru | Right | Left                    | Thru | Right | Left                       | Thru | Right | Left                    | Thru | Right |            |
| 07:00 AM               | 1                         | 0    | 0     | 0                       | 9    | 0     | 0                          | 0    | 0     | 0                       | 8    | 0     | 18         |
| 07:15 AM               | 1                         | 0    | 0     | 0                       | 2    | 1     | 0                          | 0    | 0     | 0                       | 6    | 0     | 10         |
| 07:30 AM               | 0                         | 0    | 0     | 0                       | 5    | 0     | 0                          | 0    | 0     | 1                       | 5    | 0     | 11         |
| 07:45 AM               | 1                         | 0    | 1     | 0                       | 2    | 0     | 0                          | 1    | 0     | 0                       | 7    | 0     | 12         |
| Total                  | 3                         | 0    | 1     | 0                       | 18   | 1     | 0                          | 1    | 0     | 1                       | 26   | 0     | 51         |
| 08:00 AM               | 2                         | 0    | 0     | 0                       | 4    | 0     | 0                          | 0    | 0     | 2                       | 5    | 0     | 13         |
| 08:15 AM               | 0                         | 0    | 0     | 0                       | 5    | 0     | 0                          | 0    | 0     | 0                       | 2    | 0     | 7          |
| 08:30 AM               | 0                         | 0    | 0     | 0                       | 2    | 0     | 0                          | 0    | 0     | 0                       | 4    | 0     | 6          |
| 08:45 AM               | 0                         | 0    | 0     | 0                       | 1    | 0     | 0                          | 0    | 0     | 0                       | 9    | 0     | 10         |
| Total                  | 2                         | 0    | 0     | 0                       | 12   | 0     | 0                          | 0    | 0     | 2                       | 20   | 0     | 36         |
| Grand Total            | 5                         | 0    | 1     | 0                       | 30   | 1     | 0                          | 1    | 0     | 3                       | 46   | 0     | 87         |
| Apprch %               | 83.3                      | 0    | 16.7  | 0                       | 96.8 | 3.2   | 0                          | 100  | 0     | 6.1                     | 93.9 | 0     |            |
| Total %                | 5.7                       | 0    | 1.1   | 0                       | 34.5 | 1.1   | 0                          | 1.1  | 0     | 3.4                     | 52.9 | 0     |            |

**Accurate Counts**  
978-664-2565

N/S Street : Columbia Ave / Avalon Drwy  
E/W Street: Needham Street  
City/State : Newton, MA  
Weather : Rain

File Name : 17640007  
Site Code : 17640007  
Start Date : 4/26/2017  
Page No : 10

| Groups Printed- Bikes Peds |                           |      |       |      |                         |      |       |      |                            |      |       |      |                         |      |       |      |
|----------------------------|---------------------------|------|-------|------|-------------------------|------|-------|------|----------------------------|------|-------|------|-------------------------|------|-------|------|
|                            | Avalon Drwy<br>From North |      |       |      | Needham St<br>From East |      |       |      | Columbia Ave<br>From South |      |       |      | Needham St<br>From West |      |       |      |
| Start Time                 | Left                      | Thru | Right | Peds | Left                    | Thru | Right | Peds | Left                       | Thru | Right | Peds | Left                    | Thru | Right | Peds |
| 07:00 AM                   | 0                         | 0    | 0     | 6    | 0                       | 0    | 0     | 7    | 0                          | 0    | 0     | 1    | 0                       | 0    | 0     | 2    |
| 07:15 AM                   | 0                         | 0    | 0     | 0    | 0                       | 0    | 0     | 0    | 0                          | 0    | 0     | 0    | 0                       | 0    | 0     | 1    |
| 07:30 AM                   | 0                         | 0    | 0     | 1    | 0                       | 0    | 0     | 0    | 0                          | 0    | 0     | 0    | 0                       | 0    | 0     | 2    |
| 07:45 AM                   | 0                         | 0    | 0     | 1    | 0                       | 0    | 0     | 2    | 0                          | 0    | 0     | 0    | 0                       | 0    | 0     | 1    |
| Total                      | 0                         | 0    | 0     | 8    | 0                       | 0    | 0     | 9    | 0                          | 0    | 0     | 1    | 0                       | 0    | 0     | 6    |
| 08:00 AM                   | 0                         | 0    | 0     | 0    | 0                       | 0    | 0     | 5    | 0                          | 0    | 0     | 0    | 0                       | 0    | 0     | 1    |
| 08:15 AM                   | 0                         | 0    | 0     | 4    | 0                       | 0    | 0     | 2    | 0                          | 0    | 0     | 0    | 0                       | 1    | 0     | 0    |
| 08:30 AM                   | 0                         | 0    | 0     | 2    | 0                       | 0    | 0     | 0    | 0                          | 0    | 0     | 3    | 0                       | 0    | 0     | 1    |
| 08:45 AM                   | 0                         | 0    | 0     | 2    | 0                       | 0    | 0     | 4    | 0                          | 0    | 0     | 2    | 0                       | 0    | 0     | 0    |
| Total                      | 0                         | 0    | 0     | 8    | 0                       | 0    | 0     | 11   | 0                          | 0    | 0     | 5    | 0                       | 1    | 0     | 2    |
| Grand Total                | 0                         | 0    | 0     | 16   | 0                       | 0    | 0     | 20   | 0                          | 0    | 0     | 6    | 0                       | 1    | 0     | 8    |
| Apprch %                   | 0                         | 0    | 0     |      | 0                       | 0    | 0     |      | 0                          | 0    | 0     |      | 0                       | 100  | 0     |      |
| Total %                    | 0                         | 0    | 0     |      | 0                       | 0    | 0     |      | 0                          | 0    | 0     |      | 0                       | 100  | 0     |      |

**Accurate Counts**  
978-664-2565

N/S Street : Columbia Ave / Avalon Drwy  
E/W Street: Needham Street  
City/State : Newton, MA  
Weather : Rain

File Name : 17640007  
Site Code : 17640007  
Start Date : 4/26/2017  
Page No : 1

| Groups Printed- Cars - Trucks |                           |      |       |  |                         |      |       |                            |      |       |                         |      |       |  |  |            |
|-------------------------------|---------------------------|------|-------|--|-------------------------|------|-------|----------------------------|------|-------|-------------------------|------|-------|--|--|------------|
|                               | Avalon Drwy<br>From North |      |       |  | Needham St<br>From East |      |       | Columbia Ave<br>From South |      |       | Needham St<br>From West |      |       |  |  |            |
| Start Time                    | Left                      | Thru | Right |  | Left                    | Thru | Right | Left                       | Thru | Right | Left                    | Thru | Right |  |  | Int. Total |
| 04:00 PM                      | 3                         | 0    | 1     |  | 0                       | 156  | 4     | 3                          | 1    | 3     | 7                       | 176  | 1     |  |  | 355        |
| 04:15 PM                      | 3                         | 0    | 5     |  | 2                       | 149  | 3     | 0                          | 1    | 2     | 0                       | 156  | 0     |  |  | 321        |
| 04:30 PM                      | 3                         | 0    | 7     |  | 0                       | 144  | 1     | 2                          | 1    | 1     | 4                       | 176  | 0     |  |  | 339        |
| 04:45 PM                      | 2                         | 0    | 3     |  | 1                       | 154  | 2     | 2                          | 0    | 2     | 7                       | 155  | 1     |  |  | 329        |
| Total                         | 11                        | 0    | 16    |  | 3                       | 603  | 10    | 7                          | 3    | 8     | 18                      | 663  | 2     |  |  | 1344       |
| 05:00 PM                      | 1                         | 0    | 4     |  | 0                       | 132  | 4     | 1                          | 0    | 2     | 8                       | 183  | 1     |  |  | 336        |
| 05:15 PM                      | 3                         | 0    | 3     |  | 0                       | 142  | 4     | 1                          | 0    | 0     | 6                       | 218  | 1     |  |  | 378        |
| 05:30 PM                      | 3                         | 0    | 3     |  | 1                       | 141  | 4     | 1                          | 0    | 1     | 7                       | 216  | 1     |  |  | 378        |
| 05:45 PM                      | 3                         | 0    | 3     |  | 0                       | 134  | 2     | 3                          | 2    | 0     | 7                       | 191  | 1     |  |  | 346        |
| Total                         | 10                        | 0    | 13    |  | 1                       | 549  | 14    | 6                          | 2    | 3     | 28                      | 808  | 4     |  |  | 1438       |
| Grand Total                   | 21                        | 0    | 29    |  | 4                       | 1152 | 24    | 13                         | 5    | 11    | 46                      | 1471 | 6     |  |  | 2782       |
| Apprch %                      | 42                        | 0    | 58    |  | 0.3                     | 97.6 | 2     | 44.8                       | 17.2 | 37.9  | 3                       | 96.6 | 0.4   |  |  |            |
| Total %                       | 0.8                       | 0    | 1     |  | 0.1                     | 41.4 | 0.9   | 0.5                        | 0.2  | 0.4   | 1.7                     | 52.9 | 0.2   |  |  |            |
| Cars                          | 21                        | 0    | 29    |  | 4                       | 1142 | 24    | 12                         | 4    | 11    | 46                      | 1461 | 6     |  |  | 2760       |
| % Cars                        | 100                       | 0    | 100   |  | 100                     | 99.1 | 100   | 92.3                       | 80   | 100   | 100                     | 99.3 | 100   |  |  | 99.2       |
| Trucks                        | 0                         | 0    | 0     |  | 0                       | 10   | 0     | 1                          | 1    | 0     | 0                       | 10   | 0     |  |  | 22         |
| % Trucks                      | 0                         | 0    | 0     |  | 0                       | 0.9  | 0     | 7.7                        | 20   | 0     | 0                       | 0.7  | 0     |  |  | 0.8        |



# **Accurate Counts** 978-664-2565

N/S Street : Columbia Ave / Avalon Drwy  
E/W Street: Needham Street  
City/State : Newton, MA  
Weather : Rain

File Name : 17640007  
Site Code : 17640007  
Start Date : 4/26/2017  
Page No : 2

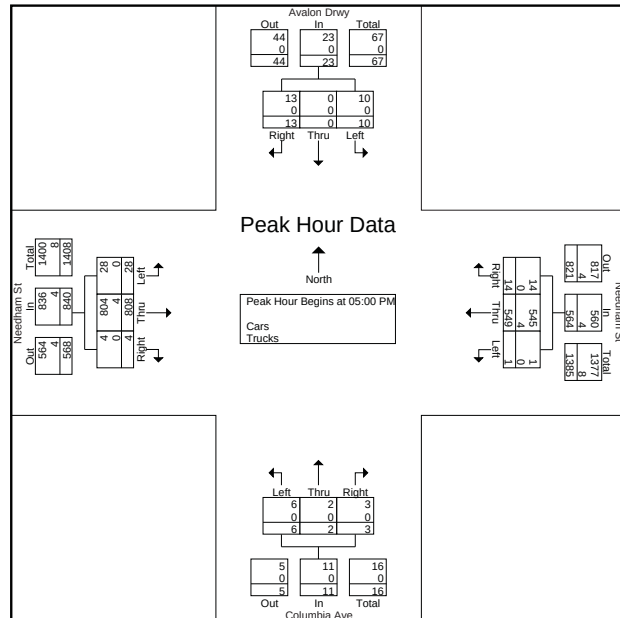
|                                                            | Avalon Drwy<br>From North |      |       |            | Needham St<br>From East |      |       |            | Columbia Ave<br>From South |      |       |            | Needham St<br>From West |      |       |            |            |
|------------------------------------------------------------|---------------------------|------|-------|------------|-------------------------|------|-------|------------|----------------------------|------|-------|------------|-------------------------|------|-------|------------|------------|
| Start Time                                                 | Left                      | Thru | Right | App. Total | Left                    | Thru | Right | App. Total | Left                       | Thru | Right | App. Total | Left                    | Thru | Right | App. Total | Int. Total |
| Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1 |                           |      |       |            |                         |      |       |            |                            |      |       |            |                         |      |       |            |            |
| Peak Hour for Entire Intersection Begins at 05:00 PM       |                           |      |       |            |                         |      |       |            |                            |      |       |            |                         |      |       |            |            |
| 05:00 PM                                                   | 1                         | 0    | 4     | 5          | 0                       | 132  | 4     | 136        | 1                          | 0    | 2     | 3          | 8                       | 183  | 1     | 192        | 336        |
| 05:15 PM                                                   | 3                         | 0    | 3     | 6          | 0                       | 142  | 4     | 146        | 1                          | 0    | 0     | 1          | 6                       | 218  | 1     | 225        | 378        |
| 05:30 PM                                                   | 3                         | 0    | 3     | 6          | 1                       | 141  | 4     | 146        | 1                          | 0    | 1     | 2          | 7                       | 216  | 1     | 224        | 378        |
| 05:45 PM                                                   | 3                         | 0    | 3     | 6          | 0                       | 134  | 2     | 136        | 3                          | 2    | 0     | 5          | 7                       | 191  | 1     | 199        | 346        |
| Total Volume                                               | 10                        | 0    | 13    | 23         | 1                       | 549  | 14    | 564        | 6                          | 2    | 3     | 11         | 28                      | 808  | 4     | 840        | 1438       |
| % App. Total                                               | 43.5                      | 0    | 56.5  |            | 0.2                     | 97.3 | 2.5   |            | 54.5                       | 18.2 | 27.3  |            | 3.3                     | 96.2 | 0.5   |            |            |
| PHF                                                        | .833                      | .000 | .813  | .958       | .250                    | .967 | .875  | .966       | .500                       | .250 | .375  | .550       | .875                    | .927 | 1.00  | .933       | .951       |
| Cars                                                       | 10                        | 0    | 13    | 23         | 1                       | 545  | 14    | 560        | 6                          | 2    | 3     | 11         | 28                      | 804  | 4     | 836        | 1430       |
| % Cars                                                     | 100                       | 0    | 100   | 100        | 100                     | 99.3 | 100   | 99.3       | 100                        | 100  | 100   | 100        | 100                     | 99.5 | 100   | 99.5       | 99.4       |
| Trucks                                                     | 0                         | 0    | 0     | 0          | 0                       | 4    | 0     | 4          | 0                          | 0    | 0     | 0          | 0                       | 4    | 0     | 4          | 8          |
| % Trucks                                                   | 0                         | 0    | 0     | 0          | 0                       | 0.7  | 0     | 0.7        | 0                          | 0    | 0     | 0          | 0                       | 0.5  | 0     | 0.5        | 0.6        |

# **Accurate Counts** 978-664-2565

N/S Street : Columbia Ave / Avalon Drwy  
E/W Street: Needham Street  
City/State : Newton, MA  
Weather : Rain

File Name : 17640007  
Site Code : 17640007  
Start Date : 4/26/2017  
Page No : 4

|             | Avalon Drwy<br>From North |      |       |  | Needham St<br>From East |      |       | Columbia Ave<br>From South |      |       |  | Needham St<br>From West |      |       |  |            |
|-------------|---------------------------|------|-------|--|-------------------------|------|-------|----------------------------|------|-------|--|-------------------------|------|-------|--|------------|
| Start Time  | Left                      | Thru | Right |  | Left                    | Thru | Right | Left                       | Thru | Right |  | Left                    | Thru | Right |  | Int. Total |
| 04:00 PM    | 3                         | 0    | 1     |  | 0                       | 154  | 4     | 3                          | 0    | 3     |  | 7                       | 174  | 1     |  | 350        |
| 04:15 PM    | 3                         | 0    | 5     |  | 2                       | 146  | 3     | 0                          | 1    | 2     |  | 0                       | 153  | 0     |  | 315        |
| 04:30 PM    | 3                         | 0    | 7     |  | 0                       | 144  | 1     | 2                          | 1    | 1     |  | 4                       | 175  | 0     |  | 338        |
| 04:45 PM    | 2                         | 0    | 3     |  | 1                       | 153  | 2     | 1                          | 0    | 2     |  | 7                       | 155  | 1     |  | 327        |
| Total       | 11                        | 0    | 16    |  | 3                       | 597  | 10    | 6                          | 2    | 8     |  | 18                      | 657  | 2     |  | 1330       |
| 05:00 PM    | 1                         | 0    | 4     |  | 0                       | 129  | 4     | 1                          | 0    | 2     |  | 8                       | 181  | 1     |  | 331        |
| 05:15 PM    | 3                         | 0    | 3     |  | 0                       | 141  | 4     | 1                          | 0    | 0     |  | 6                       | 217  | 1     |  | 376        |
| 05:30 PM    | 3                         | 0    | 3     |  | 1                       | 141  | 4     | 1                          | 0    | 1     |  | 7                       | 216  | 1     |  | 378        |
| 05:45 PM    | 3                         | 0    | 3     |  | 0                       | 134  | 2     | 3                          | 2    | 0     |  | 7                       | 190  | 1     |  | 345        |
| Total       | 10                        | 0    | 13    |  | 1                       | 545  | 14    | 6                          | 2    | 3     |  | 28                      | 804  | 4     |  | 1430       |
| Grand Total | 21                        | 0    | 29    |  | 4                       | 1142 | 24    | 12                         | 4    | 11    |  | 46                      | 1461 | 6     |  | 2760       |
| Apprch %    | 42                        | 0    | 58    |  | 0.3                     | 97.6 | 2.1   | 44.4                       | 14.8 | 40.7  |  | 3                       | 96.6 | 0.4   |  |            |
| Total %     | 0.8                       | 0    | 1.1   |  | 0.1                     | 41.4 | 0.9   | 0.4                        | 0.1  | 0.4   |  | 1.7                     | 52.9 | 0.2   |  |            |



**Accurate Counts**  
978-664-2565

N/S Street : Columbia Ave / Avalon Drwy  
E/W Street: Needham Street  
City/State : Newton, MA  
Weather : Rain

File Name : 17640007  
Site Code : 17640007  
Start Date : 4/26/2017  
Page No : 7

| Groups Printed- Trucks |                           |      |       |                         |      |       |                            |      |       |                         |      |       |            |
|------------------------|---------------------------|------|-------|-------------------------|------|-------|----------------------------|------|-------|-------------------------|------|-------|------------|
| Start Time             | Avalon Drwy<br>From North |      |       | Needham St<br>From East |      |       | Columbia Ave<br>From South |      |       | Needham St<br>From West |      |       | Int. Total |
|                        | Left                      | Thru | Right | Left                    | Thru | Right | Left                       | Thru | Right | Left                    | Thru | Right |            |
| 04:00 PM               | 0                         | 0    | 0     | 0                       | 2    | 0     | 0                          | 1    | 0     | 0                       | 2    | 0     | 5          |
| 04:15 PM               | 0                         | 0    | 0     | 0                       | 3    | 0     | 0                          | 0    | 0     | 0                       | 3    | 0     | 6          |
| 04:30 PM               | 0                         | 0    | 0     | 0                       | 0    | 0     | 0                          | 0    | 0     | 0                       | 1    | 0     | 1          |
| 04:45 PM               | 0                         | 0    | 0     | 0                       | 1    | 0     | 1                          | 0    | 0     | 0                       | 0    | 0     | 2          |
| Total                  | 0                         | 0    | 0     | 0                       | 6    | 0     | 1                          | 1    | 0     | 0                       | 6    | 0     | 14         |
| 05:00 PM               | 0                         | 0    | 0     | 0                       | 3    | 0     | 0                          | 0    | 0     | 0                       | 2    | 0     | 5          |
| 05:15 PM               | 0                         | 0    | 0     | 0                       | 1    | 0     | 0                          | 0    | 0     | 0                       | 1    | 0     | 2          |
| 05:30 PM               | 0                         | 0    | 0     | 0                       | 0    | 0     | 0                          | 0    | 0     | 0                       | 0    | 0     | 0          |
| 05:45 PM               | 0                         | 0    | 0     | 0                       | 0    | 0     | 0                          | 0    | 0     | 0                       | 1    | 0     | 1          |
| Total                  | 0                         | 0    | 0     | 0                       | 4    | 0     | 0                          | 0    | 0     | 0                       | 4    | 0     | 8          |
| Grand Total            | 0                         | 0    | 0     | 0                       | 10   | 0     | 1                          | 1    | 0     | 0                       | 10   | 0     | 22         |
| Apprch %               | 0                         | 0    | 0     | 0                       | 100  | 0     | 50                         | 50   | 0     | 0                       | 100  | 0     |            |
| Total %                | 0                         | 0    | 0     | 0                       | 45.5 | 0     | 4.5                        | 4.5  | 0     | 0                       | 45.5 | 0     |            |

**Accurate Counts**  
978-664-2565

N/S Street : Columbia Ave / Avalon Drwy  
E/W Street: Needham Street  
City/State : Newton, MA  
Weather : Rain

File Name : 17640007  
Site Code : 17640007  
Start Date : 4/26/2017  
Page No : 10

|             | Groups Printed- Bikes Peds |      |       |      |                         |      |       |      |                            |      |       |      |                         |      |       |      |              |              |            |
|-------------|----------------------------|------|-------|------|-------------------------|------|-------|------|----------------------------|------|-------|------|-------------------------|------|-------|------|--------------|--------------|------------|
|             | Avalon Drwy<br>From North  |      |       |      | Needham St<br>From East |      |       |      | Columbia Ave<br>From South |      |       |      | Needham St<br>From West |      |       |      |              |              |            |
| Start Time  | Left                       | Thru | Right | Peds | Left                    | Thru | Right | Peds | Left                       | Thru | Right | Peds | Left                    | Thru | Right | Peds | Exclu. Total | Inclu. Total | Int. Total |
| 04:00 PM    | 0                          | 0    | 0     | 3    | 0                       | 0    | 0     | 8    | 0                          | 0    | 0     | 2    | 0                       | 0    | 0     | 0    | 13           | 0            | 13         |
| 04:15 PM    | 0                          | 0    | 0     | 1    | 0                       | 0    | 0     | 1    | 0                          | 0    | 0     | 1    | 0                       | 1    | 0     | 0    | 3            | 1            | 4          |
| 04:30 PM    | 0                          | 0    | 0     | 1    | 0                       | 0    | 0     | 0    | 0                          | 0    | 0     | 0    | 0                       | 0    | 0     | 1    | 2            | 0            | 2          |
| 04:45 PM    | 0                          | 0    | 0     | 4    | 0                       | 0    | 0     | 0    | 0                          | 0    | 0     | 2    | 0                       | 0    | 0     | 0    | 6            | 0            | 6          |
| Total       | 0                          | 0    | 0     | 9    | 0                       | 0    | 0     | 9    | 0                          | 0    | 0     | 5    | 0                       | 1    | 0     | 1    | 24           | 1            | 25         |
| 05:00 PM    | 0                          | 0    | 0     | 2    | 0                       | 0    | 0     | 2    | 0                          | 0    | 0     | 3    | 0                       | 0    | 0     | 0    | 7            | 0            | 7          |
| 05:15 PM    | 0                          | 0    | 0     | 2    | 0                       | 0    | 0     | 0    | 0                          | 0    | 0     | 0    | 0                       | 0    | 0     | 1    | 3            | 0            | 3          |
| 05:30 PM    | 0                          | 0    | 0     | 5    | 0                       | 0    | 0     | 3    | 0                          | 0    | 0     | 4    | 0                       | 0    | 0     | 0    | 12           | 0            | 12         |
| 05:45 PM    | 0                          | 0    | 0     | 3    | 0                       | 0    | 0     | 1    | 0                          | 0    | 0     | 1    | 0                       | 0    | 0     | 0    | 5            | 0            | 5          |
| Total       | 0                          | 0    | 0     | 12   | 0                       | 0    | 0     | 6    | 0                          | 0    | 0     | 8    | 0                       | 0    | 0     | 1    | 27           | 0            | 27         |
| Grand Total | 0                          | 0    | 0     | 21   | 0                       | 0    | 0     | 15   | 0                          | 0    | 0     | 13   | 0                       | 1    | 0     | 2    | 51           | 1            | 52         |
| Apprch %    | 0                          | 0    | 0     |      | 0                       | 0    | 0     |      | 0                          | 0    | 0     |      | 0                       | 100  | 0     |      |              |              |            |
| Total %     | 0                          | 0    | 0     |      | 0                       | 0    | 0     |      | 0                          | 0    | 0     |      | 0                       | 100  | 0     |      | 98.1         | 1.9          |            |

Accurate Counts  
978-664-2565

N/S Street : Winchester Street  
E/W Street: Dedham St / Needham St  
City/State : Newton, MA  
Weather : Rain

File Name : 17640008  
Site Code : 17640008  
Start Date : 4/26/2017  
Page No : 1

| Groups Printed- Cars - Trucks |                             |      |       |                        |      |       |                             |      |       |                         |      |       |            |
|-------------------------------|-----------------------------|------|-------|------------------------|------|-------|-----------------------------|------|-------|-------------------------|------|-------|------------|
| Start Time                    | Winchester St<br>From North |      |       | Dedham St<br>From East |      |       | Winchester St<br>From South |      |       | Needham St<br>From West |      |       | Int. Total |
|                               | Left                        | Thru | Right | Left                   | Thru | Right | Left                        | Thru | Right | Left                    | Thru | Right |            |
| 07:00 AM                      | 7                           | 25   | 84    | 2                      | 14   | 21    | 7                           | 71   | 1     | 173                     | 18   | 2     | 425        |
| 07:15 AM                      | 13                          | 46   | 132   | 2                      | 18   | 35    | 5                           | 88   | 3     | 174                     | 19   | 5     | 540        |
| 07:30 AM                      | 11                          | 67   | 119   | 3                      | 28   | 35    | 4                           | 91   | 2     | 162                     | 10   | 2     | 534        |
| 07:45 AM                      | 9                           | 56   | 132   | 2                      | 23   | 40    | 3                           | 88   | 3     | 156                     | 16   | 11    | 539        |
| Total                         | 40                          | 194  | 467   | 9                      | 83   | 131   | 19                          | 338  | 9     | 665                     | 63   | 20    | 2038       |
| 08:00 AM                      | 12                          | 52   | 168   | 1                      | 15   | 38    | 4                           | 59   | 4     | 171                     | 23   | 10    | 557        |
| 08:15 AM                      | 11                          | 65   | 149   | 7                      | 25   | 41    | 5                           | 84   | 1     | 166                     | 23   | 13    | 590        |
| 08:30 AM                      | 15                          | 80   | 143   | 4                      | 37   | 32    | 7                           | 62   | 1     | 148                     | 25   | 9     | 563        |
| 08:45 AM                      | 5                           | 73   | 171   | 2                      | 32   | 32    | 10                          | 58   | 0     | 138                     | 18   | 7     | 546        |
| Total                         | 43                          | 270  | 631   | 14                     | 109  | 143   | 26                          | 263  | 6     | 623                     | 89   | 39    | 2256       |
| Grand Total                   | 83                          | 464  | 1098  | 23                     | 192  | 274   | 45                          | 601  | 15    | 1288                    | 152  | 59    | 4294       |
| Apprch %                      | 5                           | 28.2 | 66.7  | 4.7                    | 39.3 | 56    | 6.8                         | 90.9 | 2.3   | 85.9                    | 10.1 | 3.9   |            |
| Total %                       | 1.9                         | 10.8 | 25.6  | 0.5                    | 4.5  | 6.4   | 1                           | 14   | 0.3   | 30                      | 3.5  | 1.4   |            |
| Cars                          | 80                          | 462  | 1080  | 23                     | 191  | 272   | 45                          | 594  | 15    | 1263                    | 144  | 57    | 4226       |
| % Cars                        | 96.4                        | 99.6 | 98.4  | 100                    | 99.5 | 99.3  | 100                         | 98.8 | 100   | 98.1                    | 94.7 | 96.6  | 98.4       |
| Trucks                        | 3                           | 2    | 18    | 0                      | 1    | 2     | 0                           | 7    | 0     | 25                      | 8    | 2     | 68         |
| % Trucks                      | 3.6                         | 0.4  | 1.6   | 0                      | 0.5  | 0.7   | 0                           | 1.2  | 0     | 1.9                     | 5.3  | 3.4   | 1.6        |

Accurate Counts  
978-664-2565

N/S Street : Winchester Street  
E/W Street: Dedham St / Needham St  
City/State : Newton, MA  
Weather : Rain

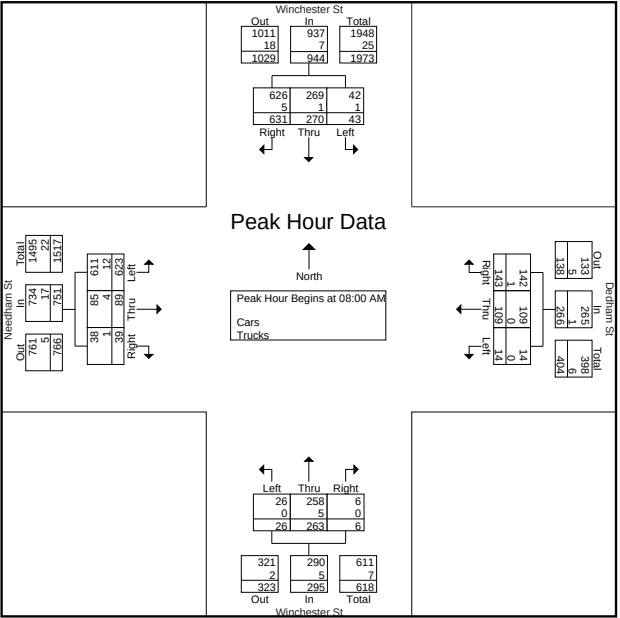
File Name : 17640008  
Site Code : 17640008  
Start Date : 4/26/2017  
Page No : 2

| Start Time   | Winchester St<br>From North |      |       |            | Dedham St<br>From East |      |       |            | Winchester St<br>From South |      |       |            | Needham St<br>From West |      |       |            | Int. Total |
|--------------|-----------------------------|------|-------|------------|------------------------|------|-------|------------|-----------------------------|------|-------|------------|-------------------------|------|-------|------------|------------|
|              | Left                        | Thru | Right | App. Total | Left                   | Thru | Right | App. Total | Left                        | Thru | Right | App. Total | Left                    | Thru | Right | App. Total |            |
| 07:00 AM     | 7                           | 25   | 84    |            | 2                      | 14   | 21    |            | 7                           | 71   | 1     |            | 173                     | 18   | 2     |            | 425        |
| 07:15 AM     | 13                          | 46   | 132   |            | 2                      | 18   | 35    |            | 5                           | 88   | 3     |            | 174                     | 19   | 5     |            | 540        |
| 07:30 AM     | 11                          | 67   | 119   |            | 3                      | 28   | 35    |            | 4                           | 91   | 2     |            | 162                     | 10   | 2     |            | 534        |
| 07:45 AM     | 9                           | 56   | 132   |            | 2                      | 23   | 40    |            | 3                           | 88   | 3     |            | 156                     | 16   | 11    |            | 539        |
| Total        | 40                          | 194  | 467   |            | 9                      | 83   | 131   |            | 19                          | 338  | 9     |            | 665                     | 63   | 20    |            | 2038       |
| 08:00 AM     | 12                          | 52   | 168   |            | 1                      | 15   | 38    |            | 4                           | 59   | 4     |            | 171                     | 23   | 10    |            | 557        |
| 08:15 AM     | 11                          | 65   | 149   |            | 7                      | 25   | 41    |            | 5                           | 84   | 1     |            | 166                     | 23   | 13    |            | 590        |
| 08:30 AM     | 15                          | 80   | 143   |            | 4                      | 37   | 32    |            | 7                           | 62   | 1     |            | 148                     | 25   | 9     |            | 563        |
| 08:45 AM     | 5                           | 73   | 171   |            | 2                      | 32   | 32    |            | 10                          | 58   | 0     |            | 138                     | 18   | 7     |            | 546        |
| Total Volume | 43                          | 270  | 631   |            | 14                     | 109  | 143   |            | 26                          | 263  | 6     |            | 623                     | 89   | 39    |            | 2256       |
| % App. Total | 4.6                         | 28.6 | 66.8  |            | 5.3                    | 41   | 53.8  |            | 8.8                         | 89.2 | 2     |            | 83                      | 11.9 | 5.2   |            |            |
| PHF          | .717                        | .844 | .923  |            | .500                   | .736 | .872  |            | .650                        | .783 | .375  |            | .911                    | .890 | .750  |            | .956       |
| Cars         | 42                          | 269  | 626   |            | 14                     | 109  | 142   |            | 26                          | 258  | 6     |            | 611                     | 85   | 38    |            | 2226       |
| % Cars       | 97.7                        | 99.6 | 99.2  |            | 100                    | 100  | 99.3  |            | 100                         | 98.1 | 100   |            | 98.1                    | 95.5 | 97.4  |            | 98.7       |
| Trucks       | 1                           | 1    | 5     |            | 0                      | 0    | 1     |            | 0                           | 5    | 0     |            | 12                      | 4    | 1     |            | 30         |
| % Trucks     | 2.3                         | 0.4  | 0.8   |            | 0                      | 0    | 0.7   |            | 0                           | 1.9  | 0     |            | 1.9                     | 4.5  | 2.6   |            | 1.3        |

Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1

Peak Hour for Entire Intersection Begins at 08:00 AM

|              |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |
|--------------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|
| 08:00 AM     | 12   | 52   | 168  | 232  | 1    | 15   | 38   | 54   | 4    | 59   | 4    | 67   | 171  | 23   | 10   | 204  | 557  |
| 08:15 AM     | 11   | 65   | 149  | 225  | 7    | 25   | 41   | 73   | 5    | 84   | 1    | 90   | 166  | 23   | 13   | 202  | 590  |
| 08:30 AM     | 15   | 80   | 143  | 238  | 4    | 37   | 32   | 73   | 7    | 62   | 1    | 70   | 148  | 25   | 9    | 182  | 563  |
| 08:45 AM     | 5    | 73   | 171  | 249  | 2    | 32   | 32   | 66   | 10   | 58   | 0    | 68   | 138  | 18   | 7    | 163  | 546  |
| Total Volume | 43   | 270  | 631  | 944  | 14   | 109  | 143  | 266  | 26   | 263  | 6    | 295  | 623  | 89   | 39   | 751  | 2256 |
| % App. Total | 4.6  | 28.6 | 66.8 |      | 5.3  | 41   | 53.8 |      | 8.8  | 89.2 | 2    |      | 83   | 11.9 | 5.2  |      |      |
| PHF          | .717 | .844 | .923 | .948 | .500 | .736 | .872 | .911 | .650 | .783 | .375 | .819 | .911 | .890 | .750 | .920 | .956 |
| Cars         | 42   | 269  | 626  | 937  | 14   | 109  | 142  | 265  | 26   | 258  | 6    | 290  | 611  | 85   | 38   | 734  | 2226 |
| % Cars       | 97.7 | 99.6 | 99.2 | 99.3 | 100  | 100  | 99.3 | 99.6 | 100  | 98.1 | 100  | 98.3 | 98.1 | 95.5 | 97.4 | 97.7 | 98.7 |
| Trucks       | 1    | 1    | 5    | 7    | 0    | 0    | 1    | 1    | 0    | 5    | 0    | 5    | 12   | 4    | 1    | 17   | 30   |
| % Trucks     | 2.3  | 0.4  | 0.8  | 0.7  | 0    | 0    | 0.7  | 0.4  | 0    | 1.9  | 0    | 1.7  | 1.9  | 4.5  | 2.6  | 2.3  | 1.3  |



# **Accurate Counts** 978-664-2565

N/S Street : Winchester Street  
E/W Street: Dedham St / Needham St  
City/State : Newton, MA  
Weather : Rain

File Name : 17640008  
Site Code : 17640008  
Start Date : 4/26/2017  
Page No : 4

| Groups Printed- Cars |                             |      |       |                        |      |       |                             |      |       |                         |      |       |            |
|----------------------|-----------------------------|------|-------|------------------------|------|-------|-----------------------------|------|-------|-------------------------|------|-------|------------|
|                      | Winchester St<br>From North |      |       | Dedham St<br>From East |      |       | Winchester St<br>From South |      |       | Needham St<br>From West |      |       |            |
| Start Time           | Left                        | Thru | Right | Left                   | Thru | Right | Left                        | Thru | Right | Left                    | Thru | Right | Int. Total |
| 07:00 AM             | 6                           | 24   | 76    | 2                      | 14   | 21    | 7                           | 70   | 1     | 168                     | 15   | 2     | 406        |
| 07:15 AM             | 12                          | 46   | 130   | 2                      | 18   | 35    | 5                           | 88   | 3     | 172                     | 18   | 4     | 533        |
| 07:30 AM             | 11                          | 67   | 117   | 3                      | 27   | 35    | 4                           | 90   | 2     | 160                     | 10   | 2     | 528        |
| 07:45 AM             | 9                           | 56   | 131   | 2                      | 23   | 39    | 3                           | 88   | 3     | 152                     | 16   | 11    | 533        |
| Total                | 38                          | 193  | 454   | 9                      | 82   | 130   | 19                          | 336  | 9     | 652                     | 59   | 19    | 2000       |
| 08:00 AM             | 12                          | 52   | 165   | 1                      | 15   | 37    | 4                           | 57   | 4     | 169                     | 20   | 10    | 546        |
| 08:15 AM             | 11                          | 65   | 147   | 7                      | 25   | 41    | 5                           | 84   | 1     | 165                     | 23   | 13    | 587        |
| 08:30 AM             | 15                          | 80   | 143   | 4                      | 37   | 32    | 7                           | 60   | 1     | 145                     | 24   | 8     | 556        |
| 08:45 AM             | 4                           | 72   | 171   | 2                      | 32   | 32    | 10                          | 57   | 0     | 132                     | 18   | 7     | 537        |
| Total                | 42                          | 269  | 626   | 14                     | 109  | 142   | 26                          | 258  | 6     | 611                     | 85   | 38    | 2226       |
| Grand Total          | 80                          | 462  | 1080  | 23                     | 191  | 272   | 45                          | 594  | 15    | 1263                    | 144  | 57    | 4226       |
| Apprch %             | 4.9                         | 28.5 | 66.6  | 4.7                    | 39.3 | 56    | 6.9                         | 90.8 | 2.3   | 86.3                    | 9.8  | 3.9   |            |
| Total %              | 1.9                         | 10.9 | 25.6  | 0.5                    | 4.5  | 6.4   | 1.1                         | 14.1 | 0.4   | 29.9                    | 3.4  | 1.3   |            |

# **Accurate Counts** 978-664-2565

N/S Street : Winchester Street  
E/W Street: Dedham St / Needham St  
City/State : Newton, MA  
Weather : Rain

File Name : 17640008  
Site Code : 17640008  
Start Date : 4/26/2017  
Page No : 7

| Groups Printed- Trucks |                             |      |       |                        |      |       |                             |      |       |                         |      |       |            |
|------------------------|-----------------------------|------|-------|------------------------|------|-------|-----------------------------|------|-------|-------------------------|------|-------|------------|
|                        | Winchester St<br>From North |      |       | Dedham St<br>From East |      |       | Winchester St<br>From South |      |       | Needham St<br>From West |      |       |            |
| Start Time             | Left                        | Thru | Right | Left                   | Thru | Right | Left                        | Thru | Right | Left                    | Thru | Right | Int. Total |
| 07:00 AM               | 1                           | 1    | 8     | 0                      | 0    | 0     | 0                           | 1    | 0     | 5                       | 3    | 0     | 19         |
| 07:15 AM               | 1                           | 0    | 2     | 0                      | 0    | 0     | 0                           | 0    | 0     | 2                       | 1    | 1     | 7          |
| 07:30 AM               | 0                           | 0    | 2     | 0                      | 1    | 0     | 0                           | 1    | 0     | 2                       | 0    | 0     | 6          |
| 07:45 AM               | 0                           | 0    | 1     | 0                      | 0    | 1     | 0                           | 0    | 0     | 4                       | 0    | 0     | 6          |
| Total                  | 2                           | 1    | 13    | 0                      | 1    | 1     | 0                           | 2    | 0     | 13                      | 4    | 1     | 38         |
| 08:00 AM               | 0                           | 0    | 3     | 0                      | 0    | 1     | 0                           | 2    | 0     | 2                       | 3    | 0     | 11         |
| 08:15 AM               | 0                           | 0    | 2     | 0                      | 0    | 0     | 0                           | 0    | 0     | 1                       | 0    | 0     | 3          |
| 08:30 AM               | 0                           | 0    | 0     | 0                      | 0    | 0     | 0                           | 2    | 0     | 3                       | 1    | 1     | 7          |
| 08:45 AM               | 1                           | 1    | 0     | 0                      | 0    | 0     | 0                           | 1    | 0     | 6                       | 0    | 0     | 9          |
| Total                  | 1                           | 1    | 5     | 0                      | 0    | 1     | 0                           | 5    | 0     | 12                      | 4    | 1     | 30         |
| Grand Total            | 3                           | 2    | 18    | 0                      | 1    | 2     | 0                           | 7    | 0     | 25                      | 8    | 2     | 68         |
| Apprch %               | 13                          | 8.7  | 78.3  | 0                      | 33.3 | 66.7  | 0                           | 100  | 0     | 71.4                    | 22.9 | 5.7   |            |
| Total %                | 4.4                         | 2.9  | 26.5  | 0                      | 1.5  | 2.9   | 0                           | 10.3 | 0     | 36.8                    | 11.8 | 2.9   |            |

978-664-2565

File Name : 17640008  
Site Code : 17640008  
Start Date : 4/26/2017  
Page No : 10

N/S Street : Winchester Street  
E/W Street: Dedham St / Needham St  
City/State : Newton, MA  
Weather : Rain

978-664-2565

File Name : 17640008  
Site Code : 17640008  
Start Date : 4/26/2017  
Page No : 1

| Groups Printed- Cars - Trucks |                          |      |       |                     |      |       |                          |      |       |                      |      |       |            |
|-------------------------------|--------------------------|------|-------|---------------------|------|-------|--------------------------|------|-------|----------------------|------|-------|------------|
|                               | Winchester St From North |      |       | Dedham St From East |      |       | Winchester St From South |      |       | Needham St From West |      |       |            |
| Start Time                    | Left                     | Thru | Right | Left                | Thru | Right | Left                     | Thru | Right | Left                 | Thru | Right | Int. Total |
| 04:00 PM                      | 11                       | 46   | 134   | 3                   | 27   | 19    | 7                        | 57   | 0     | 147                  | 24   | 8     | 483        |
| 04:15 PM                      | 12                       | 53   | 130   | 1                   | 22   | 30    | 4                        | 60   | 0     | 158                  | 17   | 6     | 493        |
| 04:30 PM                      | 6                        | 85   | 134   | 5                   | 15   | 23    | 6                        | 66   | 1     | 155                  | 24   | 9     | 529        |
| 04:45 PM                      | 13                       | 64   | 145   | 5                   | 24   | 19    | 1                        | 57   | 1     | 146                  | 22   | 7     | 504        |
| Total                         | 42                       | 248  | 543   | 14                  | 88   | 91    | 18                       | 240  | 2     | 606                  | 87   | 30    | 2009       |
| 05:00 PM                      | 20                       | 60   | 109   | 3                   | 13   | 19    | 3                        | 76   | 8     | 162                  | 21   | 6     | 500        |
| 05:15 PM                      | 19                       | 63   | 63    | 6                   | 28   | 12    | 6                        | 87   | 5     | 106                  | 32   | 15    | 442        |
| 05:30 PM                      | 18                       | 73   | 62    | 6                   | 16   | 5     | 2                        | 64   | 0     | 159                  | 25   | 13    | 443        |
| 05:45 PM                      | 21                       | 54   | 114   | 2                   | 20   | 22    | 7                        | 90   | 1     | 172                  | 26   | 8     | 537        |
| Total                         | 78                       | 250  | 348   | 17                  | 77   | 58    | 18                       | 317  | 14    | 599                  | 104  | 42    | 1922       |
| Grand Total                   | 120                      | 498  | 891   | 31                  | 165  | 149   | 36                       | 557  | 16    | 1205                 | 191  | 72    | 3931       |
| Apprch %                      | 8                        | 33   | 59    | 9                   | 47.8 | 43.2  | 5.9                      | 91.5 | 2.6   | 82.1                 | 13   | 4.9   |            |
| Total %                       | 3.1                      | 12.7 | 22.7  | 0.8                 | 4.2  | 3.8   | 0.9                      | 14.2 | 0.4   | 30.7                 | 4.9  | 1.8   |            |
| Cars                          | 120                      | 496  | 886   | 31                  | 164  | 147   | 36                       | 556  | 16    | 1199                 | 191  | 72    | 3914       |
| % Cars                        | 100                      | 99.6 | 99.4  | 100                 | 99.4 | 98.7  | 100                      | 99.8 | 100   | 99.5                 | 100  | 100   | 99.6       |
| Trucks                        | 0                        | 2    | 5     | 0                   | 1    | 2     | 0                        | 1    | 0     | 6                    | 0    | 0     | 17         |
| % Trucks                      | 0                        | 0.4  | 0.6   | 0                   | 0.6  | 1.3   | 0                        | 0.2  | 0     | 0.5                  | 0    | 0     | 0.4        |

# **Accurate Counts** 978-664-2565

N/S Street : Winchester Street  
E/W Street: Dedham St / Needham St  
City/State : Newton, MA  
Weather : Rain

File Name : 17640008  
Site Code : 17640008  
Start Date : 4/26/2017  
Page No : 2

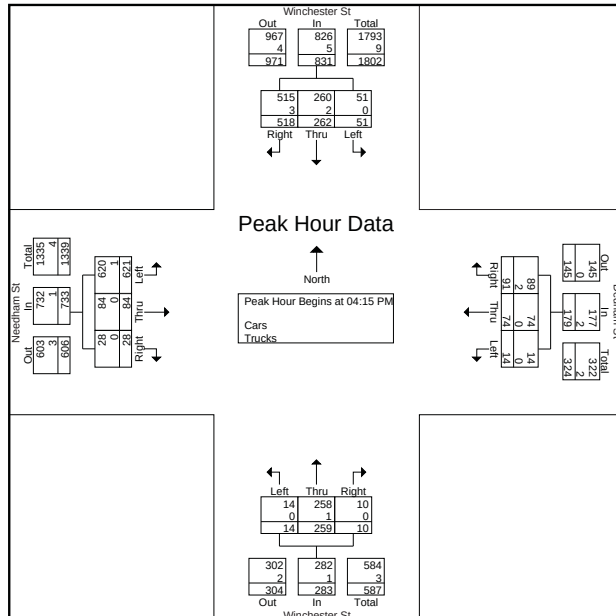
|                                                            | Winchester St<br>From North |      |       |            | Dedham St<br>From East |      |       |            | Winchester St<br>From South |      |       |            | Needham St<br>From West |      |       |            |            |
|------------------------------------------------------------|-----------------------------|------|-------|------------|------------------------|------|-------|------------|-----------------------------|------|-------|------------|-------------------------|------|-------|------------|------------|
| Start Time                                                 | Left                        | Thru | Right | App. Total | Left                   | Thru | Right | App. Total | Left                        | Thru | Right | App. Total | Left                    | Thru | Right | App. Total | Int. Total |
| Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1 |                             |      |       |            |                        |      |       |            |                             |      |       |            |                         |      |       |            |            |
| Peak Hour for Entire Intersection Begins at 04:15 PM       |                             |      |       |            |                        |      |       |            |                             |      |       |            |                         |      |       |            |            |
| 04:15 PM                                                   | 12                          | 53   | 130   | 195        | 1                      | 22   | 30    | 53         | 4                           | 60   | 0     | 64         | 158                     | 17   | 6     | 181        | 493        |
| 04:30 PM                                                   | 6                           | 85   | 134   | 225        | 5                      | 15   | 23    | 43         | 6                           | 66   | 1     | 73         | 155                     | 24   | 9     | 188        | 529        |
| 04:45 PM                                                   | 13                          | 64   | 145   | 222        | 5                      | 24   | 19    | 48         | 1                           | 57   | 1     | 59         | 146                     | 22   | 7     | 175        | 504        |
| 05:00 PM                                                   | 20                          | 60   | 109   | 189        | 3                      | 13   | 19    | 35         | 3                           | 76   | 8     | 87         | 162                     | 21   | 6     | 189        | 500        |
| Total Volume                                               | 51                          | 262  | 518   | 831        | 14                     | 74   | 91    | 179        | 14                          | 259  | 10    | 283        | 621                     | 84   | 28    | 733        | 2026       |
| % App. Total                                               | 6.1                         | 31.5 | 62.3  |            | 7.8                    | 41.3 | 50.8  |            | 4.9                         | 91.5 | 3.5   |            | 84.7                    | 11.5 | 3.8   |            |            |
| PHF                                                        | .638                        | .771 | .893  | .923       | .700                   | .771 | .758  | .844       | .583                        | .852 | .313  | .813       | .958                    | .875 | .778  | .970       | .957       |
| Cars                                                       | 51                          | 260  | 515   | 826        | 14                     | 74   | 89    | 177        | 14                          | 258  | 10    | 282        | 620                     | 84   | 28    | 732        | 2017       |
| % Cars                                                     | 100                         | 99.2 | 99.4  | 99.4       | 100                    | 100  | 97.8  | 98.9       | 100                         | 99.6 | 100   | 99.6       | 99.8                    | 100  | 100   | 99.9       | 99.6       |
| Trucks                                                     | 0                           | 2    | 3     | 5          | 0                      | 0    | 2     | 2          | 0                           | 1    | 0     | 1          | 1                       | 0    | 0     | 1          | 9          |
| % Trucks                                                   | 0                           | 0.8  | 0.6   | 0.6        | 0                      | 0    | 2.2   | 1.1        | 0                           | 0.4  | 0     | 0.4        | 0.2                     | 0    | 0     | 0.1        | 0.4        |

# **Accurate Counts** 978-664-2565

N/S Street : Winchester Street  
E/W Street: Dedham St / Needham St  
City/State : Newton, MA  
Weather : Rain

File Name : 17640008  
Site Code : 17640008  
Start Date : 4/26/2017  
Page No : 4

| Groups Printed- Cars |                             |      |       |                        |      |       |                             |      |       |                         |      |       |  |  |  |  |            |
|----------------------|-----------------------------|------|-------|------------------------|------|-------|-----------------------------|------|-------|-------------------------|------|-------|--|--|--|--|------------|
|                      | Winchester St<br>From North |      |       | Dedham St<br>From East |      |       | Winchester St<br>From South |      |       | Needham St<br>From West |      |       |  |  |  |  |            |
| Start Time           | Left                        | Thru | Right | Left                   | Thru | Right | Left                        | Thru | Right | Left                    | Thru | Right |  |  |  |  | Int. Total |
| 04:00 PM             | 11                          | 46   | 133   | 3                      | 26   | 19    | 7                           | 57   | 0     | 145                     | 24   | 8     |  |  |  |  | 479        |
| 04:15 PM             | 12                          | 52   | 129   | 1                      | 22   | 28    | 4                           | 59   | 0     | 157                     | 17   | 6     |  |  |  |  | 487        |
| 04:30 PM             | 6                           | 85   | 134   | 5                      | 15   | 23    | 6                           | 66   | 1     | 155                     | 24   | 9     |  |  |  |  | 529        |
| 04:45 PM             | 13                          | 63   | 145   | 5                      | 24   | 19    | 1                           | 57   | 1     | 146                     | 22   | 7     |  |  |  |  | 503        |
| Total                | 42                          | 246  | 541   | 14                     | 87   | 89    | 18                          | 239  | 2     | 603                     | 87   | 30    |  |  |  |  | 1998       |
| 05:00 PM             | 20                          | 60   | 107   | 3                      | 13   | 19    | 3                           | 76   | 8     | 162                     | 21   | 6     |  |  |  |  | 498        |
| 05:15 PM             | 19                          | 63   | 62    | 6                      | 28   | 12    | 6                           | 87   | 5     | 104                     | 32   | 15    |  |  |  |  | 439        |
| 05:30 PM             | 18                          | 73   | 62    | 6                      | 16   | 5     | 2                           | 64   | 0     | 159                     | 25   | 13    |  |  |  |  | 443        |
| 05:45 PM             | 21                          | 54   | 114   | 2                      | 20   | 22    | 7                           | 90   | 1     | 171                     | 26   | 8     |  |  |  |  | 536        |
| Total                | 78                          | 250  | 345   | 17                     | 77   | 58    | 18                          | 317  | 14    | 596                     | 104  | 42    |  |  |  |  | 1916       |
| Grand Total          | 120                         | 496  | 886   | 31                     | 164  | 147   | 36                          | 556  | 16    | 1199                    | 191  | 72    |  |  |  |  | 3914       |
| Apprch %             | 8                           | 33   | 59    | 9.1                    | 48   | 43    | 5.9                         | 91.4 | 2.6   | 82                      | 13.1 | 4.9   |  |  |  |  |            |
| Total %              | 3.1                         | 12.7 | 22.6  | 0.8                    | 4.2  | 3.8   | 0.9                         | 14.2 | 0.4   | 30.6                    | 4.9  | 1.8   |  |  |  |  |            |



# **Accurate Counts** 978-664-2565

N/S Street : Winchester Street  
E/W Street: Dedham St / Needham St  
City/State : Newton, MA  
Weather : Rain

File Name : 17640008  
Site Code : 17640008  
Start Date : 4/26/2017  
Page No : 7

| Groups Printed- Trucks |                             |      |       |                        |      |       |                             |      |       |                         |      |       |            |
|------------------------|-----------------------------|------|-------|------------------------|------|-------|-----------------------------|------|-------|-------------------------|------|-------|------------|
|                        | Winchester St<br>From North |      |       | Dedham St<br>From East |      |       | Winchester St<br>From South |      |       | Needham St<br>From West |      |       | Int. Total |
| Start Time             | Left                        | Thru | Right | Left                   | Thru | Right | Left                        | Thru | Right | Left                    | Thru | Right |            |
| 04:00 PM               | 0                           | 0    | 1     | 0                      | 1    | 0     | 0                           | 0    | 0     | 2                       | 0    | 0     | 4          |
| 04:15 PM               | 0                           | 1    | 1     | 0                      | 0    | 2     | 0                           | 1    | 0     | 1                       | 0    | 0     | 6          |
| 04:30 PM               | 0                           | 0    | 0     | 0                      | 0    | 0     | 0                           | 0    | 0     | 0                       | 0    | 0     | 0          |
| 04:45 PM               | 0                           | 1    | 0     | 0                      | 0    | 0     | 0                           | 0    | 0     | 0                       | 0    | 0     | 1          |
| Total                  | 0                           | 2    | 2     | 0                      | 1    | 2     | 0                           | 1    | 0     | 3                       | 0    | 0     | 11         |
| 05:00 PM               | 0                           | 0    | 2     | 0                      | 0    | 0     | 0                           | 0    | 0     | 0                       | 0    | 0     | 2          |
| 05:15 PM               | 0                           | 0    | 1     | 0                      | 0    | 0     | 0                           | 0    | 0     | 2                       | 0    | 0     | 3          |
| 05:30 PM               | 0                           | 0    | 0     | 0                      | 0    | 0     | 0                           | 0    | 0     | 0                       | 0    | 0     | 0          |
| 05:45 PM               | 0                           | 0    | 0     | 0                      | 0    | 0     | 0                           | 0    | 0     | 1                       | 0    | 0     | 1          |
| Total                  | 0                           | 0    | 3     | 0                      | 0    | 0     | 0                           | 0    | 0     | 3                       | 0    | 0     | 6          |
| Grand Total            | 0                           | 2    | 5     | 0                      | 1    | 2     | 0                           | 1    | 0     | 6                       | 0    | 0     | 17         |
| Apprch %               | 0                           | 28.6 | 71.4  | 0                      | 33.3 | 66.7  | 0                           | 100  | 0     | 100                     | 0    | 0     |            |
| Total %                | 0                           | 11.8 | 29.4  | 0                      | 5.9  | 11.8  | 0                           | 5.9  | 0     | 35.3                    | 0    | 0     |            |

# **Accurate Counts** 978-664-2565

N/S Street : Winchester Street  
E/W Street: Dedham St / Needham St  
City/State : Newton, MA  
Weather : Rain

File Name : 17640008  
Site Code : 17640008  
Start Date : 4/26/2017  
Page No : 10

| Groups Printed- Bikes, Peds |                             |      |       |      |                        |      |       |      |                             |      |       |      |                         |      |       |      |              |
|-----------------------------|-----------------------------|------|-------|------|------------------------|------|-------|------|-----------------------------|------|-------|------|-------------------------|------|-------|------|--------------|
|                             | Winchester St<br>From North |      |       |      | Dedham St<br>From East |      |       |      | Winchester St<br>From South |      |       |      | Needham St<br>From West |      |       |      |              |
| Start Time                  | Left                        | Thru | Right | Peds | Left                   | Thru | Right | Peds | Left                        | Thru | Right | Peds | Left                    | Thru | Right | Peds | Exclu. Total |
| 04:00 PM                    | 0                           | 1    | 0     | 0    | 0                      | 0    | 0     | 0    | 0                           | 2    | 0     | 1    | 0                       | 0    | 0     | 2    | 3            |
| 04:15 PM                    | 0                           | 1    | 0     | 0    | 0                      | 0    | 0     | 0    | 0                           | 0    | 0     | 0    | 1                       | 0    | 0     | 3    | 3            |
| 04:30 PM                    | 0                           | 0    | 0     | 0    | 0                      | 0    | 0     | 0    | 0                           | 1    | 0     | 0    | 0                       | 0    | 0     | 6    | 6            |
| 04:45 PM                    | 0                           | 0    | 0     | 0    | 0                      | 0    | 0     | 0    | 0                           | 0    | 0     | 0    | 0                       | 0    | 0     | 1    | 1            |
| Total                       | 0                           | 2    | 0     | 0    | 0                      | 0    | 0     | 0    | 0                           | 3    | 0     | 1    | 1                       | 0    | 0     | 12   | 13           |
| 05:00 PM                    | 0                           | 0    | 0     | 0    | 0                      | 0    | 0     | 0    | 0                           | 0    | 0     | 0    | 0                       | 0    | 0     | 1    | 1            |
| 05:15 PM                    | 0                           | 0    | 0     | 0    | 0                      | 0    | 0     | 0    | 0                           | 0    | 0     | 0    | 0                       | 0    | 0     | 0    | 0            |
| 05:30 PM                    | 0                           | 0    | 0     | 0    | 0                      | 0    | 0     | 0    | 0                           | 0    | 0     | 0    | 0                       | 0    | 0     | 0    | 0            |
| 05:45 PM                    | 0                           | 0    | 0     | 0    | 0                      | 0    | 0     | 0    | 0                           | 1    | 0     | 0    | 0                       | 0    | 0     | 0    | 1            |
| Total                       | 0                           | 0    | 0     | 0    | 0                      | 0    | 0     | 0    | 0                           | 1    | 0     | 0    | 0                       | 0    | 0     | 1    | 1            |
| Grand Total                 | 0                           | 2    | 0     | 0    | 0                      | 0    | 0     | 0    | 0                           | 4    | 0     | 1    | 1                       | 0    | 0     | 13   | 14           |
| Apprch %                    | 0                           | 100  | 0     |      | 0                      | 0    | 0     |      | 0                           | 100  | 0     |      | 100                     | 0    | 0     |      | 7            |
| Total %                     | 0                           | 28.6 | 0     |      | 0                      | 0    | 0     |      | 0                           | 57.1 | 0     |      | 14.3                    | 0    | 0     |      | 33.3         |

# Accurate Counts 978-664-2565

N/S Street : Winchester Street  
E/W Street: Route 9 EB Ramp  
City/State : Newton, MA  
Weather : Rain

File Name : 17640009  
Site Code : 17640009  
Start Date : 4/26/2017  
Page No : 1

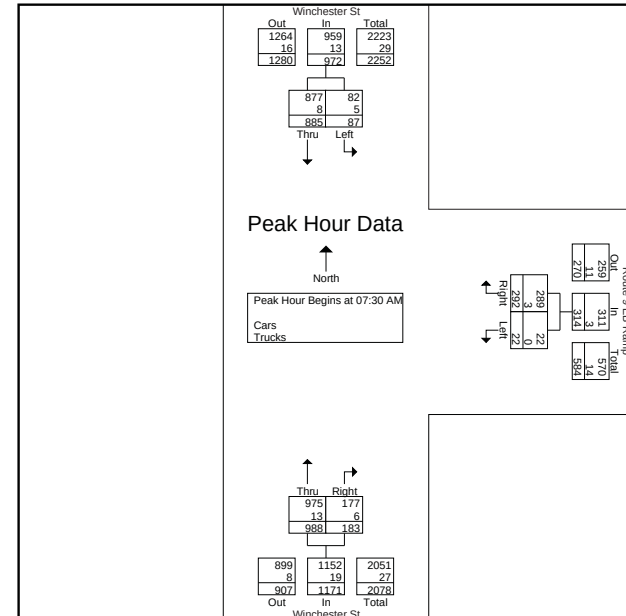
| Groups Printed- Cars - Trucks |                             |      |                              |       |                             |       |            |
|-------------------------------|-----------------------------|------|------------------------------|-------|-----------------------------|-------|------------|
| Start Time                    | Winchester St<br>From North |      | Route 9 EB Ramp<br>From East |       | Winchester St<br>From South |       | Int. Total |
|                               | Left                        | Thru | Left                         | Right | Thru                        | Right |            |
| 07:00 AM                      | 10                          | 121  | 5                            | 27    | 220                         | 37    | 420        |
| 07:15 AM                      | 41                          | 200  | 6                            | 48    | 225                         | 59    | 579        |
| 07:30 AM                      | 23                          | 211  | 5                            | 84    | 252                         | 51    | 626        |
| 07:45 AM                      | 26                          | 204  | 6                            | 77    | 215                         | 31    | 559        |
| Total                         | 100                         | 736  | 22                           | 236   | 912                         | 178   | 2184       |
| 08:00 AM                      | 30                          | 239  | 5                            | 75    | 264                         | 52    | 665        |
| 08:15 AM                      | 8                           | 231  | 6                            | 56    | 257                         | 49    | 607        |
| 08:30 AM                      | 14                          | 240  | 8                            | 76    | 182                         | 46    | 566        |
| 08:45 AM                      | 13                          | 253  | 12                           | 69    | 202                         | 34    | 583        |
| Total                         | 65                          | 963  | 31                           | 276   | 905                         | 181   | 2421       |
| Grand Total                   | 165                         | 1699 | 53                           | 512   | 1817                        | 359   | 4605       |
| Apprch %                      | 8.9                         | 91.1 | 9.4                          | 90.6  | 83.5                        | 16.5  |            |
| Total %                       | 3.6                         | 36.9 | 1.2                          | 11.1  | 39.5                        | 7.8   |            |
| Cars                          | 158                         | 1679 | 51                           | 501   | 1794                        | 348   | 4531       |
| % Cars                        | 95.8                        | 98.8 | 96.2                         | 97.9  | 98.7                        | 96.9  | 98.4       |
| Trucks                        | 7                           | 20   | 2                            | 11    | 23                          | 11    | 74         |
| % Trucks                      | 4.2                         | 1.2  | 3.8                          | 2.1   | 1.3                         | 3.1   | 1.6        |

# Accurate Counts 978-664-2565

N/S Street : Winchester Street  
E/W Street: Route 9 EB Ramp  
City/State : Newton, MA  
Weather : Rain

File Name : 17640009  
Site Code : 17640009  
Start Date : 4/26/2017  
Page No : 2

|                                                            | Winchester St<br>From North |      |            | Route 9 EB Ramp<br>From East |       |            | Winchester St<br>From South |       |            |            |
|------------------------------------------------------------|-----------------------------|------|------------|------------------------------|-------|------------|-----------------------------|-------|------------|------------|
| Start Time                                                 | Left                        | Thru | App. Total | Left                         | Right | App. Total | Thru                        | Right | App. Total | Int. Total |
| Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1 |                             |      |            |                              |       |            |                             |       |            |            |
| Peak Hour for Entire Intersection Begins at 07:30 AM       |                             |      |            |                              |       |            |                             |       |            |            |
| 07:30 AM                                                   | 23                          | 211  | 234        | 5                            | 84    | 89         | 252                         | 51    | 303        | 626        |
| 07:45 AM                                                   | 26                          | 204  | 230        | 6                            | 77    | 83         | 215                         | 31    | 246        | 559        |
| 08:00 AM                                                   | 30                          | 239  | 269        | 5                            | 75    | 80         | 264                         | 52    | 316        | 665        |
| 08:15 AM                                                   | 8                           | 231  | 239        | 6                            | 56    | 62         | 257                         | 49    | 306        | 607        |
| Total Volume                                               | 87                          | 885  | 972        | 22                           | 292   | 314        | 988                         | 183   | 1171       | 2457       |
| % App. Total                                               | 9                           | 91   |            | 7                            | 93    |            | 84.4                        | 15.6  |            |            |
| PHF                                                        | .725                        | .926 | .903       | .917                         | .869  | .882       | .936                        | .880  | .926       | .924       |
| Cars                                                       | 82                          | 877  | 959        | 22                           | 289   | 311        | 975                         | 177   | 1152       | 2422       |
| % Cars                                                     | 94.3                        | 99.1 | 98.7       | 100                          | 99.0  | 99.0       | 98.7                        | 96.7  | 98.4       | 98.6       |
| Trucks                                                     | 5                           | 8    | 13         | 0                            | 3     | 3          | 13                          | 6     | 19         | 35         |
| % Trucks                                                   | 5.7                         | 0.9  | 1.3        | 0                            | 1.0   | 1.0        | 1.3                         | 3.3   | 1.6        | 1.4        |





**Accurate Counts**  
978-664-2565

N/S Street : Winchester Street  
E/W Street: Route 9 EB Ramp  
City/State : Newton, MA  
Weather : Rain

File Name : 17640009  
Site Code : 17640009  
Start Date : 4/26/2017  
Page No : 4

| Groups Printed- Cars |                             |      |                              |       |  |                             |       |            |
|----------------------|-----------------------------|------|------------------------------|-------|--|-----------------------------|-------|------------|
| Start Time           | Winchester St<br>From North |      | Route 9 EB Ramp<br>From East |       |  | Winchester St<br>From South |       | Int. Total |
|                      | Left                        | Thru | Left                         | Right |  | Thru                        | Right |            |
| 07:00 AM             | 10                          | 114  | 3                            | 26    |  | 216                         | 34    | 403        |
| 07:15 AM             | 41                          | 197  | 6                            | 44    |  | 225                         | 58    | 571        |
| 07:30 AM             | 21                          | 209  | 5                            | 84    |  | 249                         | 48    | 616        |
| 07:45 AM             | 26                          | 202  | 6                            | 75    |  | 211                         | 31    | 551        |
| Total                | 98                          | 722  | 20                           | 229   |  | 901                         | 171   | 2141       |
| 08:00 AM             | 29                          | 236  | 5                            | 74    |  | 258                         | 51    | 653        |
| 08:15 AM             | 6                           | 230  | 6                            | 56    |  | 257                         | 47    | 602        |
| 08:30 AM             | 12                          | 241  | 8                            | 74    |  | 179                         | 46    | 560        |
| 08:45 AM             | 13                          | 250  | 12                           | 68    |  | 199                         | 33    | 575        |
| Total                | 60                          | 957  | 31                           | 272   |  | 893                         | 177   | 2390       |
| Grand Total          | 158                         | 1679 | 51                           | 501   |  | 1794                        | 348   | 4531       |
| Apprch %             | 8.6                         | 91.4 | 9.2                          | 90.8  |  | 83.8                        | 16.2  |            |
| Total %              | 3.5                         | 37.1 | 1.1                          | 11.1  |  | 39.6                        | 7.7   |            |

**Accurate Counts**  
978-664-2565

N/S Street : Winchester Street  
E/W Street: Route 9 EB Ramp  
City/State : Newton, MA  
Weather : Rain

File Name : 17640009  
Site Code : 17640009  
Start Date : 4/26/2017  
Page No : 7

| Groups Printed- Trucks |                             |      |                              |       |  |                             |       |            |
|------------------------|-----------------------------|------|------------------------------|-------|--|-----------------------------|-------|------------|
| Start Time             | Winchester St<br>From North |      | Route 9 EB Ramp<br>From East |       |  | Winchester St<br>From South |       | Int. Total |
|                        | Left                        | Thru | Left                         | Right |  | Thru                        | Right |            |
| 07:00 AM               | 0                           | 7    | 2                            | 1     |  | 4                           | 3     | 17         |
| 07:15 AM               | 0                           | 3    | 0                            | 4     |  | 0                           | 1     | 8          |
| 07:30 AM               | 2                           | 2    | 0                            | 0     |  | 3                           | 3     | 10         |
| 07:45 AM               | 0                           | 2    | 0                            | 2     |  | 4                           | 0     | 8          |
| Total                  | 2                           | 14   | 2                            | 7     |  | 11                          | 7     | 43         |
| 08:00 AM               | 1                           | 3    | 0                            | 1     |  | 6                           | 1     | 12         |
| 08:15 AM               | 2                           | 1    | 0                            | 0     |  | 0                           | 2     | 5          |
| 08:30 AM               | 2                           | -1   | 0                            | 2     |  | 3                           | 0     | 6          |
| 08:45 AM               | 0                           | 3    | 0                            | 1     |  | 3                           | 1     | 8          |
| Total                  | 5                           | 6    | 0                            | 4     |  | 12                          | 4     | 31         |
| Grand Total            | 7                           | 20   | 2                            | 11    |  | 23                          | 11    | 74         |
| Apprch %               | 25.9                        | 74.1 | 15.4                         | 84.6  |  | 67.6                        | 32.4  |            |
| Total %                | 9.5                         | 27   | 2.7                          | 14.9  |  | 31.1                        | 14.9  |            |

**Accurate Counts**  
978-664-2565

N/S Street : Winchester Street  
E/W Street: Route 9 EB Ramp  
City/State : Newton, MA  
Weather : Rain

File Name : 17640009  
Site Code : 17640009  
Start Date : 4/26/2017  
Page No : 10

| Groups Printed- Bikes Peds |                             |      |      |                              |       |      |                             |       |      |              |              |            |
|----------------------------|-----------------------------|------|------|------------------------------|-------|------|-----------------------------|-------|------|--------------|--------------|------------|
|                            | Winchester St<br>From North |      |      | Route 9 EB Ramp<br>From East |       |      | Winchester St<br>From South |       |      |              |              |            |
| Start Time                 | Left                        | Thru | Peds | Left                         | Right | Peds | Thru                        | Right | Peds | Exclu. Total | Inclu. Total | Int. Total |
| 07:00 AM                   | 0                           | 0    | 0    | 0                            | 0     | 1    | 0                           | 0     | 0    | 1            | 0            | 1          |
| 07:15 AM                   | 0                           | 0    | 1    | 0                            | 0     | 1    | 0                           | 0     | 0    | 2            | 0            | 2          |
| 07:30 AM                   | 0                           | 0    | 0    | 0                            | 0     | 1    | 0                           | 0     | 0    | 1            | 0            | 1          |
| 07:45 AM                   | 0                           | 0    | 0    | 0                            | 0     | 3    | 0                           | 0     | 0    | 3            | 0            | 3          |
| Total                      | 0                           | 0    | 1    | 0                            | 0     | 6    | 0                           | 0     | 0    | 7            | 0            | 7          |
| 08:00 AM                   | 0                           | 0    | 0    | 0                            | 0     | 2    | 0                           | 0     | 0    | 2            | 0            | 2          |
| 08:15 AM                   | 0                           | 0    | 0    | 0                            | 0     | 1    | 0                           | 0     | 0    | 1            | 0            | 1          |
| 08:30 AM                   | 0                           | 0    | 0    | 0                            | 0     | 3    | 0                           | 0     | 0    | 3            | 0            | 3          |
| 08:45 AM                   | 0                           | 0    | 0    | 0                            | 0     | 3    | 0                           | 0     | 0    | 3            | 0            | 3          |
| Total                      | 0                           | 0    | 0    | 0                            | 0     | 9    | 0                           | 0     | 0    | 9            | 0            | 9          |
| Grand Total                | 0                           | 0    | 1    | 0                            | 0     | 15   | 0                           | 0     | 0    | 16           | 0            | 16         |
| Apprch %                   | 0                           | 0    |      | 0                            | 0     |      | 0                           | 0     |      |              |              |            |
| Total %                    |                             |      |      |                              |       |      |                             |       |      | 100          | 0            |            |

**Accurate Counts**  
978-664-2565

N/S Street : Winchester Street  
E/W Street: Route 9 EB Ramp  
City/State : Newton, MA  
Weather : Rain

File Name : 17640009  
Site Code : 17640009  
Start Date : 4/26/2017  
Page No : 1

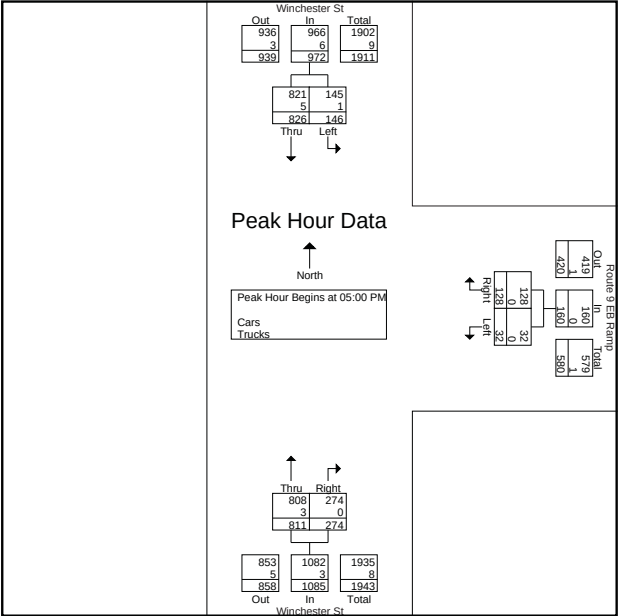
| Groups Printed- Cars - Trucks |                             |      |                              |       |                             |       |            |
|-------------------------------|-----------------------------|------|------------------------------|-------|-----------------------------|-------|------------|
|                               | Winchester St<br>From North |      | Route 9 EB Ramp<br>From East |       | Winchester St<br>From South |       |            |
| Start Time                    | Left                        | Thru | Left                         | Right | Thru                        | Right | Int. Total |
| 04:00 PM                      | 30                          | 187  | 11                           | 46    | 170                         | 52    | 496        |
| 04:15 PM                      | 29                          | 197  | 9                            | 39    | 173                         | 63    | 510        |
| 04:30 PM                      | 33                          | 211  | 10                           | 45    | 184                         | 57    | 540        |
| 04:45 PM                      | 32                          | 215  | 9                            | 23    | 184                         | 45    | 508        |
| Total                         | 124                         | 810  | 39                           | 153   | 711                         | 217   | 2054       |
| 05:00 PM                      | 24                          | 219  | 8                            | 34    | 211                         | 60    | 556        |
| 05:15 PM                      | 31                          | 205  | 8                            | 32    | 204                         | 73    | 553        |
| 05:30 PM                      | 43                          | 224  | 8                            | 29    | 199                         | 75    | 578        |
| 05:45 PM                      | 48                          | 178  | 8                            | 33    | 197                         | 66    | 530        |
| Total                         | 146                         | 826  | 32                           | 128   | 811                         | 274   | 2217       |
| Grand Total                   | 270                         | 1636 | 71                           | 281   | 1522                        | 491   | 4271       |
| Apprch %                      | 14.2                        | 85.8 | 20.2                         | 79.8  | 75.6                        | 24.4  |            |
| Total %                       | 6.3                         | 38.3 | 1.7                          | 6.6   | 35.6                        | 11.5  |            |
| Cars                          | 268                         | 1626 | 71                           | 280   | 1516                        | 490   | 4251       |
| % Cars                        | 99.3                        | 99.4 | 100                          | 99.6  | 99.6                        | 99.8  | 99.5       |
| Trucks                        | 2                           | 10   | 0                            | 1     | 6                           | 1     | 20         |
| % Trucks                      | 0.7                         | 0.6  | 0                            | 0.4   | 0.4                         | 0.2   | 0.5        |

**Accurate Counts**  
978-664-2565

N/S Street : Winchester Street  
E/W Street: Route 9 EB Ramp  
City/State : Newton, MA  
Weather : Rain

File Name : 17640009  
Site Code : 17640009  
Start Date : 4/26/2017  
Page No : 2

|                                                            | Winchester St<br>From North |      |            | Route 9 EB Ramp<br>From East |       |            | Winchester St<br>From South |       |            |            |
|------------------------------------------------------------|-----------------------------|------|------------|------------------------------|-------|------------|-----------------------------|-------|------------|------------|
| Start Time                                                 | Left                        | Thru | App. Total | Left                         | Right | App. Total | Thru                        | Right | App. Total | Int. Total |
| Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1 |                             |      |            |                              |       |            |                             |       |            |            |
| Peak Hour for Entire Intersection Begins at 05:00 PM       |                             |      |            |                              |       |            |                             |       |            |            |
| 05:00 PM                                                   | 24                          | 219  | 243        | 8                            | 34    | 42         | 211                         | 60    | 271        | 556        |
| 05:15 PM                                                   | 31                          | 205  | 236        | 8                            | 32    | 40         | 204                         | 73    | 277        | 553        |
| 05:30 PM                                                   | 43                          | 224  | 267        | 8                            | 29    | 37         | 199                         | 75    | 274        | 578        |
| 05:45 PM                                                   | 48                          | 178  | 226        | 8                            | 33    | 41         | 197                         | 66    | 263        | 530        |
| Total Volume                                               | 146                         | 826  | 972        | 32                           | 128   | 160        | 811                         | 274   | 1085       | 2217       |
| % App. Total                                               | 15                          | 85   |            | 20                           | 80    |            | 74.7                        | 25.3  |            |            |
| PHF                                                        | .760                        | .922 | .910       | 1.00                         | .941  | .952       | .961                        | .913  | .979       | .959       |
| Cars                                                       | 145                         | 821  | 966        | 32                           | 128   | 160        | 808                         | 274   | 1082       | 2208       |
| % Cars                                                     | 99.3                        | 99.4 | 99.4       | 100                          | 100   | 100        | 99.6                        | 100   | 99.7       | 99.6       |
| Trucks                                                     | 1                           | 5    | 6          | 0                            | 0     | 0          | 3                           | 0     | 3          | 9          |
| % Trucks                                                   | 0.7                         | 0.6  | 0.6        | 0                            | 0     | 0          | 0.4                         | 0     | 0.3        | 0.4        |



**Accurate Counts**  
978-664-2565

N/S Street : Winchester Street  
E/W Street: Route 9 EB Ramp  
City/State : Newton, MA  
Weather : Rain

File Name : 17640009  
Site Code : 17640009  
Start Date : 4/26/2017  
Page No : 4

| Start Time  | Winchester St<br>From North |      | Route 9 EB Ramp<br>From East |       | Winchester St<br>From South |       | Int. Total |
|-------------|-----------------------------|------|------------------------------|-------|-----------------------------|-------|------------|
|             | Left                        | Thru | Left                         | Right | Thru                        | Right |            |
| 04:00 PM    | 30                          | 186  | 11                           | 46    | 169                         | 51    | 493        |
| 04:15 PM    | 28                          | 194  | 9                            | 39    | 171                         | 63    | 504        |
| 04:30 PM    | 33                          | 211  | 10                           | 44    | 184                         | 57    | 539        |
| 04:45 PM    | 32                          | 214  | 9                            | 23    | 184                         | 45    | 507        |
| Total       | 123                         | 805  | 39                           | 152   | 708                         | 216   | 2043       |
| 05:00 PM    | 24                          | 216  | 8                            | 34    | 211                         | 60    | 553        |
| 05:15 PM    | 31                          | 203  | 8                            | 32    | 202                         | 73    | 549        |
| 05:30 PM    | 43                          | 224  | 8                            | 29    | 199                         | 75    | 578        |
| 05:45 PM    | 47                          | 178  | 8                            | 33    | 196                         | 66    | 528        |
| Total       | 145                         | 821  | 32                           | 128   | 808                         | 274   | 2208       |
| Grand Total | 268                         | 1626 | 71                           | 280   | 1516                        | 490   | 4251       |
| Apprch %    | 14.1                        | 85.9 | 20.2                         | 79.8  | 75.6                        | 24.4  |            |
| Total %     | 6.3                         | 38.2 | 1.7                          | 6.6   | 35.7                        | 11.5  |            |

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File Name : 17640009  
Site Code : 17640009  
Start Date : 4/26/2017  
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978-664-2565

File Name : 17640009  
Site Code : 17640009  
Start Date : 4/26/2017  
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# Accurate Counts 978-664-2565

N/S Street : Winchester Street  
E/W Street: Rte 9 WB Ramps  
City/State : Newton, MA  
Weather : Rain

File Name : 17640010  
Site Code : 17640010  
Start Date : 4/26/2017  
Page No : 1

| Groups Printed- Cars - Trucks |                             |      |       |                             |      |       |                             |      |       |                             |      |       |            |
|-------------------------------|-----------------------------|------|-------|-----------------------------|------|-------|-----------------------------|------|-------|-----------------------------|------|-------|------------|
| Start Time                    | Winchester St<br>From North |      |       | Rte 9 WB Ramps<br>From East |      |       | Winchester St<br>From South |      |       | Rte 9 WB Ramps<br>From West |      |       | Int. Total |
|                               | Left                        | Thru | Right | Left                        | Thru | Right | Left                        | Thru | Right | Left                        | Thru | Right |            |
| 07:00 AM                      | 0                           | 118  | 21    | 10                          | 0    | 2     | 22                          | 229  | 0     | 0                           | 0    | 2     | 404        |
| 07:15 AM                      | 0                           | 201  | 24    | 29                          | 1    | 3     | 27                          | 246  | 0     | 2                           | 0    | 14    | 547        |
| 07:30 AM                      | 0                           | 196  | 29    | 25                          | 3    | 3     | 47                          | 285  | 0     | 1                           | 0    | 9     | 598        |
| 07:45 AM                      | 0                           | 201  | 22    | 28                          | 1    | 2     | 47                          | 253  | 0     | 0                           | 0    | 5     | 559        |
| Total                         | 0                           | 716  | 96    | 92                          | 5    | 10    | 143                         | 1013 | 0     | 3                           | 0    | 30    | 2108       |
| 08:00 AM                      | 0                           | 220  | 23    | 33                          | 2    | 4     | 54                          | 279  | 0     | 0                           | 0    | 7     | 622        |
| 08:15 AM                      | 0                           | 207  | 28    | 33                          | 3    | 5     | 43                          | 268  | 0     | 0                           | 0    | 6     | 593        |
| 08:30 AM                      | 0                           | 215  | 35    | 30                          | 0    | 5     | 60                          | 202  | 0     | 0                           | 0    | 11    | 558        |
| 08:45 AM                      | 0                           | 219  | 19    | 32                          | 1    | 2     | 56                          | 217  | 0     | 0                           | 0    | 17    | 563        |
| Total                         | 0                           | 861  | 105   | 128                         | 6    | 16    | 213                         | 966  | 0     | 0                           | 0    | 41    | 2336       |
| Grand Total                   | 0                           | 1577 | 201   | 220                         | 11   | 26    | 356                         | 1979 | 0     | 3                           | 0    | 71    | 4444       |
| Apprch %                      | 0                           | 88.7 | 11.3  | 85.6                        | 4.3  | 10.1  | 15.2                        | 84.8 | 0     | 4.1                         | 0    | 95.9  |            |
| Total %                       | 0                           | 35.5 | 4.5   | 5                           | 0.2  | 0.6   | 8                           | 44.5 | 0     | 0.1                         | 0    | 1.6   |            |
| Cars                          | 0                           | 1552 | 199   | 218                         | 11   | 24    | 346                         | 1957 | 0     | 3                           | 0    | 71    | 4381       |
| % Cars                        | 0                           | 98.4 | 99    | 99.1                        | 100  | 92.3  | 97.2                        | 98.9 | 0     | 100                         | 0    | 100   | 98.6       |
| Trucks                        | 0                           | 25   | 2     | 2                           | 0    | 2     | 10                          | 22   | 0     | 0                           | 0    | 0     | 63         |
| % Trucks                      | 0                           | 1.6  | 1     | 0.9                         | 0    | 7.7   | 2.8                         | 1.1  | 0     | 0                           | 0    | 0     | 1.4        |

# Accurate Counts 978-664-2565

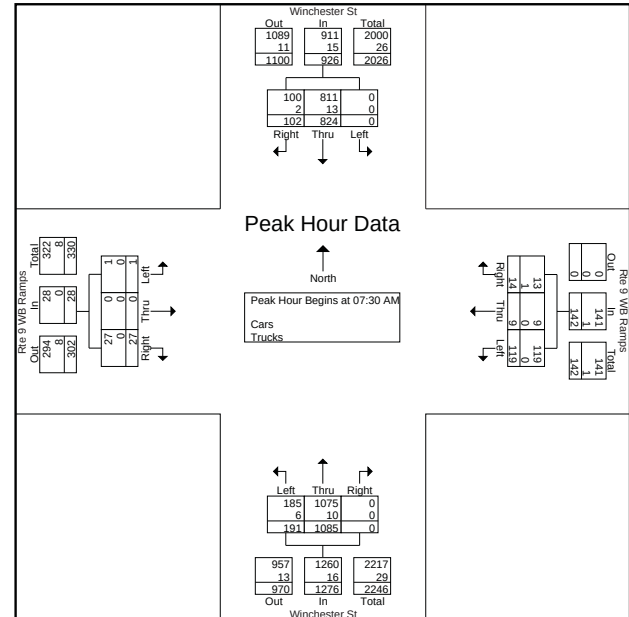
N/S Street : Winchester Street  
E/W Street: Rte 9 WB Ramps  
City/State : Newton, MA  
Weather : Rain

File Name : 17640010  
Site Code : 17640010  
Start Date : 4/26/2017  
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| Start Time   | Winchester St<br>From North |      |       |            | Rte 9 WB Ramps<br>From East |      |       |            | Winchester St<br>From South |      |       |            | Rte 9 WB Ramps<br>From West |      |       |            | Int. Total |
|--------------|-----------------------------|------|-------|------------|-----------------------------|------|-------|------------|-----------------------------|------|-------|------------|-----------------------------|------|-------|------------|------------|
|              | Left                        | Thru | Right | App. Total | Left                        | Thru | Right | App. Total | Left                        | Thru | Right | App. Total | Left                        | Thru | Right | App. Total |            |
| 07:00 AM     | 0                           | 196  | 29    | 225        | 25                          | 3    | 3     | 31         | 47                          | 285  | 0     | 332        | 1                           | 0    | 9     | 10         | 598        |
| 07:15 AM     | 0                           | 201  | 22    | 223        | 28                          | 1    | 2     | 31         | 47                          | 253  | 0     | 300        | 0                           | 0    | 5     | 5          | 559        |
| 08:00 AM     | 0                           | 220  | 23    | 243        | 33                          | 2    | 4     | 39         | 54                          | 279  | 0     | 333        | 0                           | 0    | 7     | 7          | 622        |
| 08:15 AM     | 0                           | 207  | 28    | 235        | 33                          | 3    | 5     | 41         | 43                          | 268  | 0     | 311        | 0                           | 0    | 6     | 6          | 593        |
| Total Volume | 0                           | 824  | 102   | 926        | 119                         | 9    | 14    | 142        | 191                         | 1085 | 0     | 1276       | 1                           | 0    | 27    | 28         | 2372       |
| % App. Total | 0                           | 89   | 11    |            | 83.8                        | 6.3  | 9.9   |            | 15                          | 85   | 0     |            | 3.6                         | 0    | 96.4  |            |            |
| PHF          | .000                        | .936 | .879  | .953       | .902                        | .750 | .700  | .866       | .884                        | .952 | .000  | .958       | .250                        | .000 | .750  | .700       | .953       |
| Cars         | 0                           | 811  | 100   | 911        | 119                         | 9    | 13    | 141        | 185                         | 1075 | 0     | 1260       | 1                           | 0    | 27    | 28         | 2340       |
| % Cars       | 0                           | 98.4 | 98.0  | 98.4       | 100                         | 100  | 92.9  | 99.3       | 96.9                        | 99.1 | 0     | 98.7       | 100                         | 0    | 100   | 100        | 98.7       |
| Trucks       | 0                           | 13   | 2     | 15         | 0                           | 0    | 1     | 1          | 6                           | 10   | 0     | 16         | 0                           | 0    | 0     | 0          | 32         |
| % Trucks     | 0                           | 1.6  | 2.0   | 1.6        | 0                           | 0    | 7.1   | 0.7        | 3.1                         | 0.9  | 0     | 1.3        | 0                           | 0    | 0     | 0          | 1.3        |

Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1

Peak Hour for Entire Intersection Begins at 07:30 AM



# **Accurate Counts** 978-664-2565

N/S Street : Winchester Street  
E/W Street: Rte 9 WB Ramps  
City/State : Newton, MA  
Weather : Rain

File Name : 17640010  
Site Code : 17640010  
Start Date : 4/26/2017  
Page No : 4

| Groups Printed- Cars |                             |      |       |                             |      |       |                             |      |       |                             |      |       |            |
|----------------------|-----------------------------|------|-------|-----------------------------|------|-------|-----------------------------|------|-------|-----------------------------|------|-------|------------|
| Start Time           | Winchester St<br>From North |      |       | Rte 9 WB Ramps<br>From East |      |       | Winchester St<br>From South |      |       | Rte 9 WB Ramps<br>From West |      |       | Int. Total |
|                      | Left                        | Thru | Right | Left                        | Thru | Right | Left                        | Thru | Right | Left                        | Thru | Right |            |
| 07:00 AM             | 0                           | 112  | 21    | 9                           | 0    | 2     | 20                          | 226  | 0     | 0                           | 0    | 2     | 392        |
| 07:15 AM             | 0                           | 199  | 24    | 28                          | 1    | 2     | 27                          | 244  | 0     | 2                           | 0    | 14    | 541        |
| 07:30 AM             | 0                           | 192  | 29    | 25                          | 3    | 3     | 46                          | 283  | 0     | 1                           | 0    | 9     | 591        |
| 07:45 AM             | 0                           | 199  | 21    | 28                          | 1    | 2     | 44                          | 250  | 0     | 0                           | 0    | 5     | 550        |
| Total                | 0                           | 702  | 95    | 90                          | 5    | 9     | 137                         | 1003 | 0     | 3                           | 0    | 30    | 2074       |
| 08:00 AM             | 0                           | 216  | 23    | 33                          | 2    | 3     | 52                          | 274  | 0     | 0                           | 0    | 7     | 610        |
| 08:15 AM             | 0                           | 204  | 27    | 33                          | 3    | 5     | 43                          | 268  | 0     | 0                           | 0    | 6     | 589        |
| 08:30 AM             | 0                           | 214  | 35    | 30                          | 0    | 5     | 60                          | 197  | 0     | 0                           | 0    | 11    | 552        |
| 08:45 AM             | 0                           | 216  | 19    | 32                          | 1    | 2     | 54                          | 215  | 0     | 0                           | 0    | 17    | 556        |
| Total                | 0                           | 850  | 104   | 128                         | 6    | 15    | 209                         | 954  | 0     | 0                           | 0    | 41    | 2307       |
| Grand Total          | 0                           | 1552 | 199   | 218                         | 11   | 24    | 346                         | 1957 | 0     | 3                           | 0    | 71    | 4381       |
| Apprch %             | 0                           | 88.6 | 11.4  | 86.2                        | 4.3  | 9.5   | 15                          | 85   | 0     | 4.1                         | 0    | 95.9  |            |
| Total %              | 0                           | 35.4 | 4.5   | 5                           | 0.3  | 0.5   | 7.9                         | 44.7 | 0     | 0.1                         | 0    | 1.6   |            |

# **Accurate Counts** 978-664-2565

N/S Street : Winchester Street  
E/W Street: Rte 9 WB Ramps  
City/State : Newton, MA  
Weather : Rain

File Name : 17640010  
Site Code : 17640010  
Start Date : 4/26/2017  
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| Groups Printed- Trucks |                             |      |       |                             |      |       |                             |      |       |                             |      |       |            |
|------------------------|-----------------------------|------|-------|-----------------------------|------|-------|-----------------------------|------|-------|-----------------------------|------|-------|------------|
| Start Time             | Winchester St<br>From North |      |       | Rte 9 WB Ramps<br>From East |      |       | Winchester St<br>From South |      |       | Rte 9 WB Ramps<br>From West |      |       | Int. Total |
|                        | Left                        | Thru | Right | Left                        | Thru | Right | Left                        | Thru | Right | Left                        | Thru | Right |            |
| 07:00 AM               | 0                           | 6    | 0     | 1                           | 0    | 0     | 2                           | 3    | 0     | 0                           | 0    | 0     | 12         |
| 07:15 AM               | 0                           | 2    | 0     | 1                           | 0    | 1     | 0                           | 2    | 0     | 0                           | 0    | 0     | 6          |
| 07:30 AM               | 0                           | 4    | 0     | 0                           | 0    | 0     | 1                           | 2    | 0     | 0                           | 0    | 0     | 7          |
| 07:45 AM               | 0                           | 2    | 1     | 0                           | 0    | 0     | 3                           | 3    | 0     | 0                           | 0    | 0     | 9          |
| Total                  | 0                           | 14   | 1     | 2                           | 0    | 1     | 6                           | 10   | 0     | 0                           | 0    | 0     | 34         |
| 08:00 AM               | 0                           | 4    | 0     | 0                           | 0    | 1     | 2                           | 5    | 0     | 0                           | 0    | 0     | 12         |
| 08:15 AM               | 0                           | 3    | 1     | 0                           | 0    | 0     | 0                           | 0    | 0     | 0                           | 0    | 0     | 4          |
| 08:30 AM               | 0                           | 1    | 0     | 0                           | 0    | 0     | 0                           | 5    | 0     | 0                           | 0    | 0     | 6          |
| 08:45 AM               | 0                           | 3    | 0     | 0                           | 0    | 0     | 2                           | 2    | 0     | 0                           | 0    | 0     | 7          |
| Total                  | 0                           | 11   | 1     | 0                           | 0    | 1     | 4                           | 12   | 0     | 0                           | 0    | 0     | 29         |
| Grand Total            | 0                           | 25   | 2     | 2                           | 0    | 2     | 10                          | 22   | 0     | 0                           | 0    | 0     | 63         |
| Apprch %               | 0                           | 92.6 | 7.4   | 50                          | 0    | 50    | 31.2                        | 68.8 | 0     | 0                           | 0    | 0     |            |
| Total %                | 0                           | 39.7 | 3.2   | 3.2                         | 0    | 3.2   | 15.9                        | 34.9 | 0     | 0                           | 0    | 0     |            |

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File Name : 17640010  
Site Code : 17640010  
Start Date : 4/26/2017  
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N/S Street : Winchester Street  
E/W Street: Rte 9 WB Ramps  
City/State : Newton, MA  
Weather : Rain

978-664-2565

File Name : 17640010  
Site Code : 17640010  
Start Date : 4/26/2017  
Page No : 1

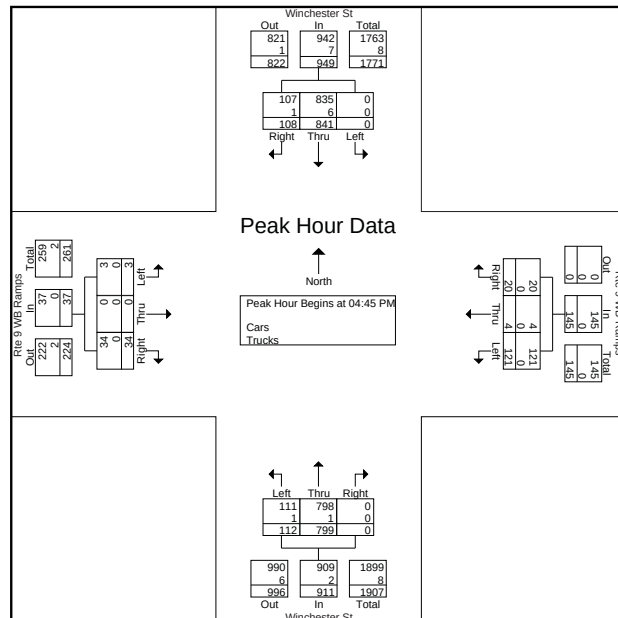
| Groups Printed- Cars - Trucks |                             |      |       |                             |      |       |                             |      |       |                             |      |       |            |  |
|-------------------------------|-----------------------------|------|-------|-----------------------------|------|-------|-----------------------------|------|-------|-----------------------------|------|-------|------------|--|
|                               | Winchester St<br>From North |      |       | Rte 9 WB Ramps<br>From East |      |       | Winchester St<br>From South |      |       | Rte 9 WB Ramps<br>From West |      |       |            |  |
| Start Time                    | Left                        | Thru | Right | Left                        | Thru | Right | Left                        | Thru | Right | Left                        | Thru | Right | Int. Total |  |
| 04:00 PM                      | 0                           | 180  | 40    | 25                          | 4    | 3     | 37                          | 176  | 0     | 0                           | 0    | 12    | 477        |  |
| 04:15 PM                      | 0                           | 195  | 37    | 29                          | 1    | 6     | 45                          | 170  | 0     | 1                           | 0    | 5     | 489        |  |
| 04:30 PM                      | 0                           | 207  | 30    | 26                          | 4    | 5     | 35                          | 197  | 0     | 1                           | 0    | 8     | 513        |  |
| 04:45 PM                      | 0                           | 204  | 25    | 38                          | 2    | 4     | 26                          | 181  | 0     | 1                           | 0    | 13    | 494        |  |
| Total                         | 0                           | 786  | 132   | 118                         | 11   | 18    | 143                         | 724  | 0     | 3                           | 0    | 38    | 1973       |  |
| 05:00 PM                      | 0                           | 214  | 22    | 19                          | 1    | 4     | 26                          | 212  | 0     | 1                           | 0    | 4     | 503        |  |
| 05:15 PM                      | 0                           | 199  | 34    | 27                          | 1    | 6     | 35                          | 205  | 0     | 0                           | 0    | 8     | 515        |  |
| 05:30 PM                      | 0                           | 224  | 27    | 37                          | 0    | 6     | 25                          | 201  | 0     | 1                           | 0    | 9     | 530        |  |
| 05:45 PM                      | 0                           | 178  | 34    | 27                          | 2    | 6     | 22                          | 209  | 0     | 0                           | 0    | 15    | 493        |  |
| Total                         | 0                           | 815  | 117   | 110                         | 4    | 22    | 108                         | 827  | 0     | 2                           | 0    | 36    | 2041       |  |
| Grand Total                   | 0                           | 1601 | 249   | 228                         | 15   | 40    | 251                         | 1551 | 0     | 5                           | 0    | 74    | 4014       |  |
| Apprch %                      | 0                           | 86.5 | 13.5  | 80.6                        | 5.3  | 14.1  | 13.9                        | 86.1 | 0     | 6.3                         | 0    | 93.7  |            |  |
| Total %                       | 0                           | 39.9 | 6.2   | 5.7                         | 0.4  | 1     | 6.3                         | 38.6 | 0     | 0.1                         | 0    | 1.8   |            |  |
| Cars                          | 0                           | 1589 | 247   | 228                         | 15   | 40    | 250                         | 1545 | 0     | 5                           | 0    | 74    | 3993       |  |
| % Cars                        | 0                           | 99.3 | 99.2  | 100                         | 100  | 100   | 99.6                        | 99.6 | 0     | 100                         | 0    | 100   | 99.5       |  |
| Trucks                        | 0                           | 12   | 2     | 0                           | 0    | 0     | 1                           | 6    | 0     | 0                           | 0    | 0     | 21         |  |
| % Trucks                      | 0                           | 0.7  | 0.8   | 0                           | 0    | 0     | 0.4                         | 0.4  | 0     | 0                           | 0    | 0     | 0.5        |  |

N/S Street : Winchester Street  
E/W Street: Rte 9 WB Ramps  
City/State : Newton, MA  
Weather : Rain

N/S Street : Winchester Street  
E/W Street: Rte 9 WB Ramps  
City/State : Newton, MA  
Weather : Rain

File Name : 17640010  
Site Code : 17640010  
Start Date : 4/26/2017  
Page No : 4

|                                                            | Winchester St<br>From North |      |       |            | Rte 9 WB Ramps<br>From East |      |       |            | Winchester St<br>From South |      |       |            | Rte 9 WB Ramps<br>From West |      |       |            |            |
|------------------------------------------------------------|-----------------------------|------|-------|------------|-----------------------------|------|-------|------------|-----------------------------|------|-------|------------|-----------------------------|------|-------|------------|------------|
| Start Time                                                 | Left                        | Thru | Right | App. Total | Left                        | Thru | Right | App. Total | Left                        | Thru | Right | App. Total | Left                        | Thru | Right | App. Total | Int. Total |
| Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1 |                             |      |       |            |                             |      |       |            |                             |      |       |            |                             |      |       |            |            |
| Peak Hour for Entire Intersection Begins at 04:45 PM       |                             |      |       |            |                             |      |       |            |                             |      |       |            |                             |      |       |            |            |
| 04:45 PM                                                   | 0                           | 204  | 25    | 229        | 38                          | 2    | 4     | 44         | 26                          | 181  | 0     | 207        | 1                           | 0    | 13    | 14         | 494        |
| 05:00 PM                                                   | 0                           | 214  | 22    | 236        | 19                          | 1    | 4     | 24         | 26                          | 212  | 0     | 238        | 1                           | 0    | 4     | 5          | 503        |
| 05:15 PM                                                   | 0                           | 199  | 34    | 233        | 27                          | 1    | 6     | 34         | 35                          | 205  | 0     | 240        | 0                           | 0    | 8     | 8          | 515        |
| 05:30 PM                                                   | 0                           | 224  | 27    | 251        | 37                          | 0    | 6     | 43         | 25                          | 201  | 0     | 226        | 1                           | 0    | 9     | 10         | 530        |
| Total Volume                                               | 0                           | 841  | 108   | 949        | 121                         | 4    | 20    | 145        | 112                         | 799  | 0     | 911        | 3                           | 0    | 34    | 37         | 2042       |
| % App. Total                                               | 0                           | 88.6 | 11.4  |            | 83.4                        | 2.8  | 13.8  |            | 12.3                        | 87.7 | 0     |            | 8.1                         | 0    | 91.9  |            |            |
| PHF                                                        | .000                        | .939 | .794  | .945       | .796                        | .500 | .833  | .824       | .800                        | .942 | .000  | .949       | .750                        | .000 | .654  | .661       | .963       |
| Cars                                                       | 0                           | 835  | 107   | 942        | 121                         | 4    | 20    | 145        | 111                         | 798  | 0     | 909        | 3                           | 0    | 34    | 37         | 2033       |
| % Cars                                                     | 0                           | 99.3 | 99.1  | 99.3       | 100                         | 100  | 100   | 100        | 99.1                        | 99.9 | 0     | 99.8       | 100                         | 0    | 100   | 100        | 99.6       |
| Trucks                                                     | 0                           | 6    | 1     | 7          | 0                           | 0    | 0     | 0          | 1                           | 1    | 0     | 2          | 0                           | 0    | 0     | 0          | 9          |
| % Trucks                                                   | 0                           | 0.7  | 0.9   | 0.7        | 0                           | 0    | 0     | 0          | 0.9                         | 0.1  | 0     | 0.2        | 0                           | 0    | 0     | 0          | 0.4        |



N/S Street : Winchester Street  
E/W Street: Rte 9 WB Ramps  
City/State : Newton, MA  
Weather : Rain

File Name : 17640010  
Site Code : 17640010  
Start Date : 4/26/2017  
Page No : 4

| Groups Printed- Cars |                             |      |       |                             |      |       |                             |      |       |                             |      |       |            |
|----------------------|-----------------------------|------|-------|-----------------------------|------|-------|-----------------------------|------|-------|-----------------------------|------|-------|------------|
|                      | Winchester St<br>From North |      |       | Rte 9 WB Ramps<br>From East |      |       | Winchester St<br>From South |      |       | Rte 9 WB Ramps<br>From West |      |       |            |
| Start Time           | Left                        | Thru | Right | Left                        | Thru | Right | Left                        | Thru | Right | Left                        | Thru | Right | Int. Total |
| 04:00 PM             | 0                           | 179  | 40    | 25                          | 4    | 3     | 37                          | 175  | 0     | 0                           | 0    | 12    | 475        |
| 04:15 PM             | 0                           | 191  | 37    | 29                          | 1    | 6     | 45                          | 168  | 0     | 1                           | 0    | 5     | 483        |
| 04:30 PM             | 0                           | 207  | 29    | 26                          | 4    | 5     | 35                          | 196  | 0     | 1                           | 0    | 8     | 511        |
| 04:45 PM             | 0                           | 203  | 25    | 38                          | 2    | 4     | 26                          | 181  | 0     | 1                           | 0    | 13    | 493        |
| Total                | 0                           | 780  | 131   | 118                         | 11   | 18    | 143                         | 720  | 0     | 3                           | 0    | 38    | 1962       |
| 05:00 PM             | 0                           | 211  | 22    | 19                          | 1    | 4     | 26                          | 212  | 0     | 1                           | 0    | 4     | 500        |
| 05:15 PM             | 0                           | 197  | 33    | 27                          | 1    | 6     | 34                          | 204  | 0     | 0                           | 0    | 8     | 510        |
| 05:30 PM             | 0                           | 224  | 27    | 37                          | 0    | 6     | 25                          | 201  | 0     | 1                           | 0    | 9     | 530        |
| 05:45 PM             | 0                           | 177  | 34    | 27                          | 2    | 6     | 22                          | 208  | 0     | 0                           | 0    | 15    | 491        |
| Total                | 0                           | 809  | 116   | 110                         | 4    | 22    | 107                         | 825  | 0     | 2                           | 0    | 36    | 2031       |
| Grand Total          | 0                           | 1589 | 247   | 228                         | 15   | 40    | 250                         | 1545 | 0     | 5                           | 0    | 74    | 3993       |
| Apprch %             | 0                           | 86.5 | 13.5  | 80.6                        | 5.3  | 14.1  | 13.9                        | 86.1 | 0     | 6.3                         | 0    | 93.7  |            |
| Total %              | 0                           | 39.8 | 6.2   | 5.7                         | 0.4  | 1     | 6.3                         | 38.7 | 0     | 0.1                         | 0    | 1.9   |            |



# **Accurate Counts** 978-664-2565

N/S Street : Winchester Street  
E/W Street: Rte 9 WB Ramps  
City/State : Newton, MA  
Weather : Rain

File Name : 17640010  
Site Code : 17640010  
Start Date : 4/26/2017  
Page No : 7

| Groups Printed- Trucks |                             |      |       |                             |      |       |                             |      |       |                             |      |       |            |
|------------------------|-----------------------------|------|-------|-----------------------------|------|-------|-----------------------------|------|-------|-----------------------------|------|-------|------------|
| Start Time             | Winchester St<br>From North |      |       | Rte 9 WB Ramps<br>From East |      |       | Winchester St<br>From South |      |       | Rte 9 WB Ramps<br>From West |      |       | Int. Total |
|                        | Left                        | Thru | Right | Left                        | Thru | Right | Left                        | Thru | Right | Left                        | Thru | Right |            |
| 04:00 PM               | 0                           | 1    | 0     | 0                           | 0    | 0     | 0                           | 1    | 0     | 0                           | 0    | 0     | 2          |
| 04:15 PM               | 0                           | 4    | 0     | 0                           | 0    | 0     | 0                           | 2    | 0     | 0                           | 0    | 0     | 6          |
| 04:30 PM               | 0                           | 0    | 1     | 0                           | 0    | 0     | 0                           | 1    | 0     | 0                           | 0    | 0     | 2          |
| 04:45 PM               | 0                           | 1    | 0     | 0                           | 0    | 0     | 0                           | 0    | 0     | 0                           | 0    | 0     | 1          |
| Total                  | 0                           | 6    | 1     | 0                           | 0    | 0     | 0                           | 4    | 0     | 0                           | 0    | 0     | 11         |
| 05:00 PM               | 0                           | 3    | 0     | 0                           | 0    | 0     | 0                           | 0    | 0     | 0                           | 0    | 0     | 3          |
| 05:15 PM               | 0                           | 2    | 1     | 0                           | 0    | 0     | 1                           | 1    | 0     | 0                           | 0    | 0     | 5          |
| 05:30 PM               | 0                           | 0    | 0     | 0                           | 0    | 0     | 0                           | 0    | 0     | 0                           | 0    | 0     | 0          |
| 05:45 PM               | 0                           | 1    | 0     | 0                           | 0    | 0     | 0                           | 1    | 0     | 0                           | 0    | 0     | 2          |
| Total                  | 0                           | 6    | 1     | 0                           | 0    | 0     | 1                           | 2    | 0     | 0                           | 0    | 0     | 10         |
| Grand Total            | 0                           | 12   | 2     | 0                           | 0    | 0     | 1                           | 6    | 0     | 0                           | 0    | 0     | 21         |
| Apprch %               | 0                           | 85.7 | 14.3  | 0                           | 0    | 0     | 14.3                        | 85.7 | 0     | 0                           | 0    | 0     |            |
| Total %                | 0                           | 57.1 | 9.5   | 0                           | 0    | 0     | 4.8                         | 28.6 | 0     | 0                           | 0    | 0     |            |

# **Accurate Counts** 978-664-2565

N/S Street : Winchester Street  
E/W Street: Rte 9 WB Ramps  
City/State : Newton, MA  
Weather : Rain

File Name : 17640010  
Site Code : 17640010  
Start Date : 4/26/2017  
Page No : 10

| Groups Printed- Bikes, Peds |                             |      |       |      |                             |      |       |      |                             |      |       |      |                             |      |       |      |
|-----------------------------|-----------------------------|------|-------|------|-----------------------------|------|-------|------|-----------------------------|------|-------|------|-----------------------------|------|-------|------|
| Start Time                  | Winchester St<br>From North |      |       |      | Rte 9 WB Ramps<br>From East |      |       |      | Winchester St<br>From South |      |       |      | Rte 9 WB Ramps<br>From West |      |       |      |
|                             | Left                        | Thru | Right | Peds | Left                        | Thru | Right | Peds | Left                        | Thru | Right | Peds | Left                        | Thru | Right | Peds |
| 04:00 PM                    | 0                           | 0    | 0     | 0    | 0                           | 0    | 0     | 3    | 0                           | 2    | 0     | 0    | 0                           | 0    | 0     | 3    |
| 04:15 PM                    | 0                           | 1    | 0     | 0    | 0                           | 0    | 0     | 0    | 0                           | 1    | 0     | 0    | 0                           | 0    | 2     | 2    |
| 04:30 PM                    | 0                           | 0    | 0     | 0    | 0                           | 0    | 0     | 2    | 0                           | 1    | 0     | 0    | 0                           | 0    | 2     | 4    |
| 04:45 PM                    | 0                           | 0    | 0     | 0    | 0                           | 0    | 0     | 0    | 0                           | 0    | 0     | 0    | 0                           | 0    | 4     | 4    |
| Total                       | 0                           | 1    | 0     | 0    | 0                           | 0    | 0     | 5    | 0                           | 4    | 0     | 0    | 0                           | 0    | 11    | 21   |
| 05:00 PM                    | 0                           | 0    | 0     | 0    | 0                           | 0    | 0     | 3    | 0                           | 1    | 0     | 0    | 0                           | 0    | 4     | 8    |
| 05:15 PM                    | 0                           | 0    | 0     | 0    | 0                           | 0    | 0     | 4    | 0                           | 0    | 0     | 0    | 0                           | 0    | 4     | 8    |
| 05:30 PM                    | 0                           | 0    | 0     | 0    | 0                           | 0    | 0     | 3    | 0                           | 0    | 0     | 0    | 0                           | 0    | 2     | 5    |
| 05:45 PM                    | 0                           | 0    | 0     | 0    | 0                           | 0    | 0     | 4    | 0                           | 1    | 0     | 1    | 0                           | 0    | 9     | 15   |
| Total                       | 0                           | 0    | 0     | 0    | 0                           | 0    | 0     | 14   | 0                           | 2    | 0     | 1    | 0                           | 0    | 19    | 36   |
| Grand Total                 | 0                           | 1    | 0     | 0    | 0                           | 0    | 0     | 19   | 0                           | 6    | 0     | 1    | 0                           | 0    | 30    | 57   |
| Apprch %                    | 0                           | 100  | 0     |      | 0                           | 0    | 0     |      | 0                           | 100  | 0     |      | 0                           | 0    | 0     |      |
| Total %                     | 0                           | 14.3 | 0     |      | 0                           | 0    | 0     |      | 0                           | 85.7 | 0     |      | 0                           | 0    | 0     |      |

# Accurate Counts 978-664-2565

N/S Street : Staples Drive / 2nd Avenue  
E/W Street: Highland Avenue  
City/State : Needham, MA  
Weather : Rain

File Name : 17640004  
Site Code : 17640004  
Start Date : 4/26/2017  
Page No : 1

| Groups Printed- Cars - Trucks |                            |      |       |                           |      |       |                       |      |       |                           |      |       |            |
|-------------------------------|----------------------------|------|-------|---------------------------|------|-------|-----------------------|------|-------|---------------------------|------|-------|------------|
| Start Time                    | Staples Drwy<br>From North |      |       | Highland Ave<br>From East |      |       | 2nd Ave<br>From South |      |       | Highland Ave<br>From West |      |       | Int. Total |
|                               | Left                       | Thru | Right | Left                      | Thru | Right | Left                  | Thru | Right | Left                      | Thru | Right |            |
| 07:00 AM                      | 6                          | 4    | 0     | 14                        | 96   | 3     | 54                    | 2    | 25    | 2                         | 204  | 37    | 447        |
| 07:15 AM                      | 8                          | 0    | 1     | 32                        | 124  | 1     | 95                    | 2    | 28    | 0                         | 195  | 46    | 532        |
| 07:30 AM                      | 7                          | 3    | 0     | 38                        | 147  | 2     | 95                    | 0    | 16    | 0                         | 179  | 45    | 532        |
| 07:45 AM                      | 6                          | 1    | 0     | 46                        | 154  | 2     | 103                   | 0    | 36    | 1                         | 192  | 35    | 576        |
| Total                         | 27                         | 8    | 1     | 130                       | 521  | 8     | 347                   | 4    | 105   | 3                         | 770  | 163   | 2087       |
| 08:00 AM                      | 4                          | 3    | 0     | 56                        | 133  | 3     | 75                    | 2    | 27    | 0                         | 169  | 50    | 522        |
| 08:15 AM                      | 7                          | 1    | 0     | 64                        | 142  | 2     | 93                    | 3    | 38    | 1                         | 155  | 38    | 544        |
| 08:30 AM                      | 4                          | 5    | 0     | 74                        | 125  | 7     | 94                    | 3    | 35    | 2                         | 140  | 51    | 540        |
| 08:45 AM                      | 4                          | 2    | 0     | 73                        | 139  | 9     | 87                    | 2    | 40    | 3                         | 173  | 62    | 594        |
| Total                         | 19                         | 11   | 0     | 267                       | 539  | 21    | 349                   | 10   | 140   | 6                         | 637  | 201   | 2200       |
| Grand Total                   | 46                         | 19   | 1     | 397                       | 1060 | 29    | 696                   | 14   | 245   | 9                         | 1407 | 364   | 4287       |
| Apprch %                      | 69.7                       | 28.8 | 1.5   | 26.7                      | 71.3 | 2     | 72.9                  | 1.5  | 25.7  | 0.5                       | 79   | 20.4  |            |
| Total %                       | 1.1                        | 0.4  | 0     | 9.3                       | 24.7 | 0.7   | 16.2                  | 0.3  | 5.7   | 0.2                       | 32.8 | 8.5   |            |
| Cars                          | 46                         | 19   | 1     | 396                       | 1041 | 29    | 680                   | 14   | 240   | 8                         | 1393 | 361   | 4228       |
| % Cars                        | 100                        | 100  | 100   | 99.7                      | 98.2 | 100   | 97.7                  | 100  | 98    | 88.9                      | 99   | 99.2  | 98.6       |
| Trucks                        | 0                          | 0    | 0     | 1                         | 19   | 0     | 16                    | 0    | 5     | 1                         | 14   | 3     | 59         |
| % Trucks                      | 0                          | 0    | 0     | 0.3                       | 1.8  | 0     | 2.3                   | 0    | 2     | 11.1                      | 1    | 0.8   | 1.4        |

# Accurate Counts 978-664-2565

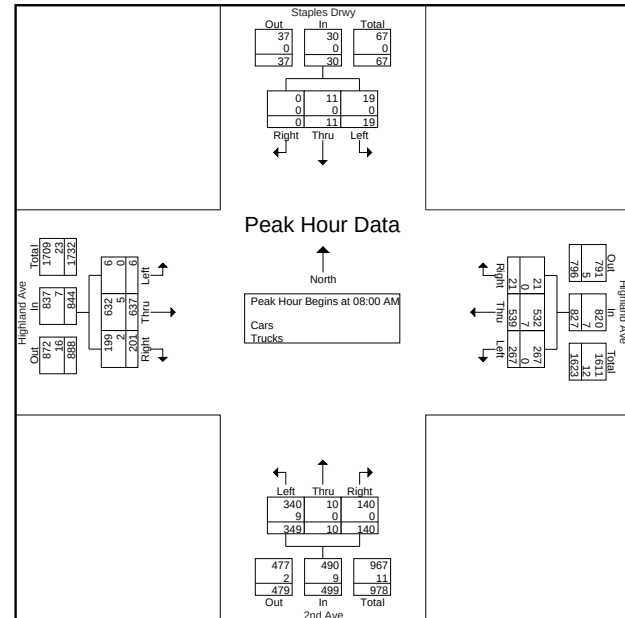
N/S Street : Staples Drive / 2nd Avenue  
E/W Street: Highland Avenue  
City/State : Needham, MA  
Weather : Rain

File Name : 17640004  
Site Code : 17640004  
Start Date : 4/26/2017  
Page No : 2

| Start Time   | Staples Drwy<br>From North |      |       |            | Highland Ave<br>From East |      |       |            | 2nd Ave<br>From South |      |       |            | Highland Ave<br>From West |      |       |            | Int. Total |
|--------------|----------------------------|------|-------|------------|---------------------------|------|-------|------------|-----------------------|------|-------|------------|---------------------------|------|-------|------------|------------|
|              | Left                       | Thru | Right | App. Total | Left                      | Thru | Right | App. Total | Left                  | Thru | Right | App. Total | Left                      | Thru | Right | App. Total |            |
| 07:00 AM     | 6                          | 4    | 0     | 10         | 14                        | 96   | 3     | 113        | 54                    | 2    | 25    | 81         | 2                         | 204  | 37    | 447        |            |
| 07:15 AM     | 8                          | 0    | 1     | 9          | 32                        | 124  | 1     | 157        | 95                    | 2    | 28    | 125        | 0                         | 195  | 46    | 532        |            |
| 07:30 AM     | 7                          | 3    | 0     | 10         | 38                        | 147  | 2     | 187        | 95                    | 0    | 16    | 111        | 0                         | 179  | 45    | 532        |            |
| 07:45 AM     | 6                          | 1    | 0     | 7          | 46                        | 154  | 2     | 203        | 103                   | 0    | 36    | 139        | 1                         | 192  | 35    | 576        |            |
| Total        | 27                         | 8    | 1     | 36         | 130                       | 521  | 8     | 659        | 347                   | 4    | 105   | 456        | 3                         | 770  | 163   | 2087       |            |
| 08:00 AM     | 4                          | 3    | 0     | 7          | 56                        | 133  | 3     | 192        | 75                    | 2    | 27    | 104        | 0                         | 169  | 50    | 219        | 522        |
| 08:15 AM     | 7                          | 1    | 0     | 8          | 64                        | 142  | 2     | 208        | 93                    | 3    | 38    | 134        | 1                         | 155  | 38    | 194        | 544        |
| 08:30 AM     | 4                          | 5    | 0     | 9          | 74                        | 125  | 7     | 206        | 94                    | 3    | 35    | 132        | 2                         | 140  | 51    | 193        | 540        |
| 08:45 AM     | 4                          | 2    | 0     | 6          | 73                        | 139  | 9     | 221        | 87                    | 2    | 40    | 129        | 3                         | 173  | 62    | 238        | 594        |
| Total Volume | 19                         | 11   | 0     | 30         | 267                       | 539  | 21    | 827        | 349                   | 10   | 140   | 499        | 6                         | 637  | 201   | 844        | 2200       |
| % App. Total | 63.3                       | 36.7 | 0     |            | 32.3                      | 65.2 | 2.5   |            | 69.9                  | 2    | 28.1  |            | 0.7                       | 75.5 | 23.8  |            |            |
| PHF          | .679                       | .550 | .000  | .833       | .902                      | .949 | .583  | .936       | .928                  | .833 | .875  | .931       | .500                      | .921 | .810  | .887       | .926       |
| Cars         | 19                         | 11   | 0     | 30         | 267                       | 532  | 21    | 820        | 340                   | 10   | 140   | 490        | 6                         | 632  | 199   | 837        | 2177       |
| % Cars       | 100                        | 100  | 0     | 100        | 100                       | 98.7 | 100   | 99.2       | 97.4                  | 100  | 100   | 98.2       | 100                       | 99.2 | 99.0  | 99.2       | 99.0       |
| Trucks       | 0                          | 0    | 0     | 0          | 0                         | 7    | 0     | 7          | 9                     | 0    | 0     | 9          | 0                         | 5    | 2     | 7          | 23         |
| % Trucks     | 0                          | 0    | 0     | 0          | 0                         | 1.3  | 0     | 0.8        | 2.6                   | 0    | 0     | 1.8        | 0                         | 0.8  | 1.0   | 0.8        | 1.0        |

Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1

Peak Hour for Entire Intersection Begins at 08:00 AM



**Accurate Counts**  
978-664-2565

N/S Street : Staples Drive / 2nd Avenue  
E/W Street: Highland Avenue  
City/State : Needham, MA  
Weather : Rain

File Name : 17640004  
Site Code : 17640004  
Start Date : 4/26/2017  
Page No : 4

| Groups Printed- Cars |                            |      |       |                           |      |       |                       |      |       |                           |      |       |            |
|----------------------|----------------------------|------|-------|---------------------------|------|-------|-----------------------|------|-------|---------------------------|------|-------|------------|
|                      | Staples Drwy<br>From North |      |       | Highland Ave<br>From East |      |       | 2nd Ave<br>From South |      |       | Highland Ave<br>From West |      |       |            |
| Start Time           | Left                       | Thru | Right | Left                      | Thru | Right | Left                  | Thru | Right | Left                      | Thru | Right | Int. Total |
| 07:00 AM             | 6                          | 4    | 0     | 13                        | 91   | 3     | 53                    | 2    | 22    | 1                         | 203  | 37    | 435        |
| 07:15 AM             | 8                          | 0    | 1     | 32                        | 123  | 1     | 93                    | 2    | 27    | 0                         | 191  | 45    | 523        |
| 07:30 AM             | 7                          | 3    | 0     | 38                        | 144  | 2     | 93                    | 0    | 16    | 0                         | 178  | 45    | 526        |
| 07:45 AM             | 6                          | 1    | 0     | 46                        | 151  | 2     | 101                   | 0    | 35    | 1                         | 189  | 35    | 567        |
| Total                | 27                         | 8    | 1     | 129                       | 509  | 8     | 340                   | 4    | 100   | 2                         | 761  | 162   | 2051       |
| 08:00 AM             | 4                          | 3    | 0     | 56                        | 132  | 3     | 73                    | 2    | 27    | 0                         | 166  | 50    | 516        |
| 08:15 AM             | 7                          | 1    | 0     | 64                        | 139  | 2     | 91                    | 3    | 38    | 1                         | 154  | 38    | 538        |
| 08:30 AM             | 4                          | 5    | 0     | 74                        | 124  | 7     | 91                    | 3    | 35    | 2                         | 140  | 50    | 535        |
| 08:45 AM             | 4                          | 2    | 0     | 73                        | 137  | 9     | 85                    | 2    | 40    | 3                         | 172  | 61    | 588        |
| Total                | 19                         | 11   | 0     | 267                       | 532  | 21    | 340                   | 10   | 140   | 6                         | 632  | 199   | 2177       |
| Grand Total          | 46                         | 19   | 1     | 396                       | 1041 | 29    | 680                   | 14   | 240   | 8                         | 1393 | 361   | 4228       |
| Apprch %             | 69.7                       | 28.8 | 1.5   | 27                        | 71   | 2     | 72.8                  | 1.5  | 25.7  | 0.5                       | 79.1 | 20.5  |            |
| Total %              | 1.1                        | 0.4  | 0     | 9.4                       | 24.6 | 0.7   | 16.1                  | 0.3  | 5.7   | 0.2                       | 32.9 | 8.5   |            |

**Accurate Counts**  
978-664-2565

N/S Street : Staples Drive / 2nd Avenue  
E/W Street: Highland Avenue  
City/State : Needham, MA  
Weather : Rain

File Name : 17640004  
Site Code : 17640004  
Start Date : 4/26/2017  
Page No : 7

| Groups Printed- Trucks |                            |      |       |                           |      |       |                       |      |       |                           |      |       |            |
|------------------------|----------------------------|------|-------|---------------------------|------|-------|-----------------------|------|-------|---------------------------|------|-------|------------|
|                        | Staples Drwy<br>From North |      |       | Highland Ave<br>From East |      |       | 2nd Ave<br>From South |      |       | Highland Ave<br>From West |      |       |            |
| Start Time             | Left                       | Thru | Right | Left                      | Thru | Right | Left                  | Thru | Right | Left                      | Thru | Right | Int. Total |
| 07:00 AM               | 0                          | 0    | 0     | 1                         | 5    | 0     | 1                     | 0    | 3     | 1                         | 1    | 0     | 12         |
| 07:15 AM               | 0                          | 0    | 0     | 0                         | 1    | 0     | 2                     | 0    | 1     | 0                         | 4    | 1     | 9          |
| 07:30 AM               | 0                          | 0    | 0     | 0                         | 3    | 0     | 2                     | 0    | 0     | 0                         | 1    | 0     | 6          |
| 07:45 AM               | 0                          | 0    | 0     | 0                         | 3    | 0     | 2                     | 0    | 1     | 0                         | 3    | 0     | 9          |
| Total                  | 0                          | 0    | 0     | 1                         | 12   | 0     | 7                     | 0    | 5     | 1                         | 9    | 1     | 36         |
| 08:00 AM               | 0                          | 0    | 0     | 0                         | 1    | 0     | 2                     | 0    | 0     | 0                         | 3    | 0     | 6          |
| 08:15 AM               | 0                          | 0    | 0     | 0                         | 3    | 0     | 2                     | 0    | 0     | 0                         | 1    | 0     | 6          |
| 08:30 AM               | 0                          | 0    | 0     | 0                         | 1    | 0     | 3                     | 0    | 0     | 0                         | 0    | 1     | 5          |
| 08:45 AM               | 0                          | 0    | 0     | 0                         | 2    | 0     | 2                     | 0    | 0     | 0                         | 1    | 1     | 6          |
| Total                  | 0                          | 0    | 0     | 0                         | 7    | 0     | 9                     | 0    | 0     | 0                         | 5    | 2     | 23         |
| Grand Total            | 0                          | 0    | 0     | 1                         | 19   | 0     | 16                    | 0    | 5     | 1                         | 14   | 3     | 59         |
| Apprch %               | 0                          | 0    | 0     | 5                         | 95   | 0     | 76.2                  | 0    | 23.8  | 5.6                       | 77.8 | 16.7  |            |
| Total %                | 0                          | 0    | 0     | 1.7                       | 32.2 | 0     | 27.1                  | 0    | 8.5   | 1.7                       | 23.7 | 5.1   |            |

Accurate Counts  
978-664-2565

N/S Street : Staples Drive / 2nd Avenue  
E/W Street: Highland Avenue  
City/State : Needham, MA  
Weather : Rain

File Name : 17640004  
Site Code : 17640004  
Start Date : 4/26/2017  
Page No : 10

| Groups Printed- Bikes, Peds |                            |      |       |      |                           |      |       |      |                       |      |       |      |                           |      |       |      |              |              |            |
|-----------------------------|----------------------------|------|-------|------|---------------------------|------|-------|------|-----------------------|------|-------|------|---------------------------|------|-------|------|--------------|--------------|------------|
|                             | Staples Drwy<br>From North |      |       |      | Highland Ave<br>From East |      |       |      | 2nd Ave<br>From South |      |       |      | Highland Ave<br>From West |      |       |      |              |              |            |
| Start Time                  | Left                       | Thru | Right | Peds | Left                      | Thru | Right | Peds | Left                  | Thru | Right | Peds | Left                      | Thru | Right | Peds | Excls. Total | Incls. Total | Int. Total |
| 07:00 AM                    | 0                          | 0    | 0     | 1    | 0                         | 0    | 0     | 0    | 0                     | 0    | 0     | 0    | 0                         | 0    | 0     | 1    | 2            | 0            | 2          |
| 07:15 AM                    | 0                          | 0    | 0     | 0    | 0                         | 0    | 0     | 0    | 0                     | 0    | 0     | 0    | 0                         | 0    | 0     | 0    | 0            | 0            | 0          |
| 07:30 AM                    | 0                          | 0    | 0     | 0    | 0                         | 0    | 0     | 1    | 0                     | 0    | 0     | 0    | 0                         | 0    | 0     | 0    | 1            | 0            | 1          |
| 07:45 AM                    | 0                          | 0    | 0     | 1    | 0                         | 0    | 0     | 0    | 0                     | 0    | 0     | 0    | 0                         | 0    | 0     | 0    | 1            | 0            | 1          |
| Total                       | 0                          | 0    | 0     | 2    | 0                         | 0    | 0     | 1    | 0                     | 0    | 0     | 0    | 0                         | 0    | 0     | 1    | 4            | 0            | 4          |
| 08:00 AM                    | 0                          | 0    | 0     | 1    | 0                         | 0    | 0     | 0    | 0                     | 0    | 0     | 0    | 0                         | 0    | 0     | 0    | 1            | 0            | 1          |
| 08:15 AM                    | 0                          | 0    | 0     | 0    | 0                         | 0    | 0     | 4    | 0                     | 0    | 0     | 0    | 0                         | 1    | 0     | 1    | 5            | 1            | 6          |
| 08:30 AM                    | 0                          | 0    | 0     | 0    | 0                         | 0    | 0     | 2    | 0                     | 0    | 0     | 1    | 0                         | 0    | 0     | 0    | 3            | 0            | 3          |
| 08:45 AM                    | 0                          | 0    | 0     | 2    | 0                         | 0    | 0     | 0    | 0                     | 0    | 0     | 0    | 0                         | 0    | 0     | 0    | 2            | 0            | 2          |
| Total                       | 0                          | 0    | 0     | 3    | 0                         | 0    | 0     | 6    | 0                     | 0    | 0     | 1    | 0                         | 1    | 0     | 1    | 11           | 1            | 12         |
| Grand Total                 | 0                          | 0    | 0     | 5    | 0                         | 0    | 0     | 7    | 0                     | 0    | 0     | 1    | 0                         | 1    | 0     | 2    | 15           | 1            | 16         |
| Apprch %                    | 0                          | 0    | 0     |      | 0                         | 0    | 0     |      | 0                     | 0    | 0     |      | 0                         | 100  | 0     |      |              |              |            |
| Total %                     | 0                          | 0    | 0     |      | 0                         | 0    | 0     |      | 0                     | 0    | 0     |      | 0                         | 100  | 0     |      | 93.8         | 6.2          |            |

Accurate Counts  
978-664-2565

N/S Street : Staples Drive / 2nd Avenue  
E/W Street: Highland Avenue  
City/State : Needham, MA  
Weather : Rain

File Name : 17640004  
Site Code : 17640004  
Start Date : 4/26/2017  
Page No : 1

| Groups Printed- Cars - Trucks |                            |      |       |                           |      |       |                       |      |       |                           |      |       |            |
|-------------------------------|----------------------------|------|-------|---------------------------|------|-------|-----------------------|------|-------|---------------------------|------|-------|------------|
|                               | Staples Drwy<br>From North |      |       | Highland Ave<br>From East |      |       | 2nd Ave<br>From South |      |       | Highland Ave<br>From West |      |       | Int. Total |
| Start Time                    | Left                       | Thru | Right | Left                      | Thru | Right | Left                  | Thru | Right | Left                      | Thru | Right |            |
| 04:00 PM                      | 10                         | 3    | 7     | 32                        | 185  | 10    | 148                   | 4    | 27    | 2                         | 119  | 19    | 566        |
| 04:15 PM                      | 10                         | 3    | 4     | 36                        | 205  | 8     | 137                   | 2    | 32    | 4                         | 136  | 19    | 596        |
| 04:30 PM                      | 13                         | 6    | 3     | 25                        | 183  | 12    | 165                   | 4    | 35    | 1                         | 134  | 26    | 607        |
| 04:45 PM                      | 21                         | 6    | 10    | 35                        | 167  | 8     | 158                   | 1    | 30    | 5                         | 138  | 18    | 597        |
| Total                         | 54                         | 18   | 24    | 128                       | 740  | 38    | 608                   | 11   | 124   | 12                        | 527  | 82    | 2366       |
| 05:00 PM                      | 13                         | 4    | 8     | 39                        | 204  | 12    | 176                   | 7    | 29    | 2                         | 151  | 30    | 675        |
| 05:15 PM                      | 15                         | 2    | 3     | 36                        | 154  | 12    | 204                   | 6    | 40    | 3                         | 116  | 19    | 610        |
| 05:30 PM                      | 16                         | 3    | 8     | 27                        | 162  | 9     | 159                   | 5    | 45    | 1                         | 128  | 20    | 583        |
| 05:45 PM                      | 8                          | 4    | 6     | 34                        | 154  | 7     | 181                   | 3    | 43    | 0                         | 144  | 22    | 606        |
| Total                         | 52                         | 13   | 25    | 136                       | 674  | 40    | 720                   | 21   | 157   | 6                         | 539  | 91    | 2474       |
| Grand Total                   | 106                        | 31   | 49    | 264                       | 1414 | 78    | 1328                  | 32   | 281   | 18                        | 1066 | 173   | 4840       |
| Apprch %                      | 57                         | 16.7 | 26.3  | 15                        | 80.5 | 4.4   | 80.9                  | 2    | 17.1  | 1.4                       | 84.8 | 13.8  |            |
| Total %                       | 2.2                        | 0.6  | 1     | 5.5                       | 29.2 | 1.6   | 27.4                  | 0.7  | 5.8   | 0.4                       | 22   | 3.6   |            |
| Cars                          | 106                        | 31   | 49    | 261                       | 1408 | 78    | 1326                  | 32   | 280   | 18                        | 1064 | 173   | 4826       |
| % Cars                        | 100                        | 100  | 100   | 98.9                      | 99.6 | 100   | 99.8                  | 100  | 99.6  | 100                       | 99.8 | 100   | 99.7       |
| Trucks                        | 0                          | 0    | 0     | 3                         | 6    | 0     | 2                     | 0    | 1     | 0                         | 2    | 0     | 14         |
| % Trucks                      | 0                          | 0    | 0     | 1.1                       | 0.4  | 0     | 0.2                   | 0    | 0.4   | 0                         | 0.2  | 0     | 0.3        |

Accurate Counts  
978-664-2565

N/S Street : Staples Drive / 2nd Avenue  
E/W Street: Highland Avenue  
City/State : Needham, MA  
Weather : Rain

File Name : 17640004  
Site Code : 17640004  
Start Date : 4/26/2017  
Page No : 2

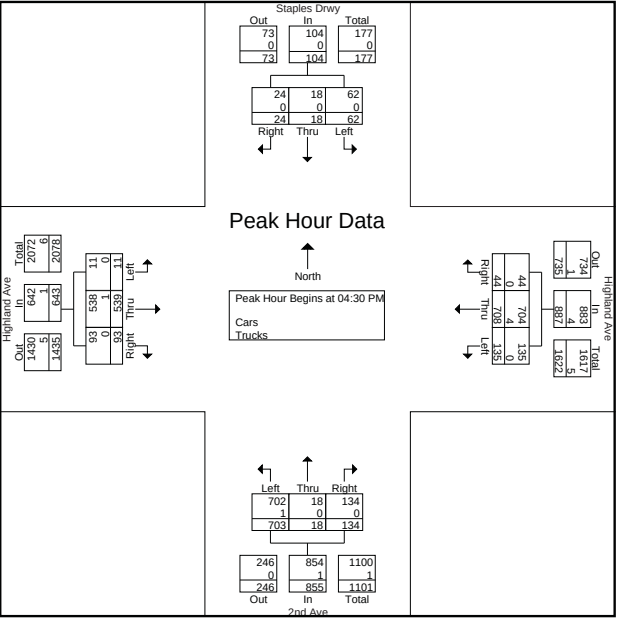
|                                                            | Staples Drwy<br>From North |      |       |            | Highland Ave<br>From East |      |       |            | 2nd Ave<br>From South |      |       |            | Highland Ave<br>From West |      |       |            |            |
|------------------------------------------------------------|----------------------------|------|-------|------------|---------------------------|------|-------|------------|-----------------------|------|-------|------------|---------------------------|------|-------|------------|------------|
| Start Time                                                 | Left                       | Thru | Right | App. Total | Left                      | Thru | Right | App. Total | Left                  | Thru | Right | App. Total | Left                      | Thru | Right | App. Total | Int. Total |
| Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1 |                            |      |       |            |                           |      |       |            |                       |      |       |            |                           |      |       |            |            |
| Peak Hour for Entire Intersection Begins at 04:30 PM       |                            |      |       |            |                           |      |       |            |                       |      |       |            |                           |      |       |            |            |
| 04:30 PM                                                   | 13                         | 6    | 3     | 22         | 25                        | 183  | 12    | 220        | 165                   | 4    | 35    | 204        | 1                         | 134  | 26    | 161        | 607        |
| 04:45 PM                                                   | 21                         | 6    | 10    | 37         | 35                        | 167  | 8     | 210        | 158                   | 1    | 30    | 189        | 5                         | 138  | 18    | 161        | 597        |
| 05:00 PM                                                   | 13                         | 4    | 8     | 25         | 39                        | 204  | 12    | 255        | 176                   | 7    | 29    | 212        | 2                         | 151  | 30    | 183        | 675        |
| 05:15 PM                                                   | 15                         | 2    | 3     | 20         | 36                        | 154  | 12    | 202        | 204                   | 6    | 40    | 250        | 3                         | 116  | 19    | 138        | 610        |
| Total Volume                                               | 62                         | 18   | 24    | 104        | 135                       | 708  | 44    | 887        | 703                   | 18   | 134   | 855        | 11                        | 539  | 93    | 643        | 2489       |
| % App. Total                                               | 59.6                       | 17.3 | 23.1  |            | 15.2                      | 79.8 | 5     |            | 82.2                  | 2.1  | 15.7  |            | 1.7                       | 83.8 | 14.5  |            |            |
| PHF                                                        | .738                       | .750 | .600  | .703       | .865                      | .868 | .917  | .870       | .862                  | .643 | .838  | .855       | .550                      | .892 | .775  | .878       | .922       |
| Cars                                                       | 62                         | 18   | 24    | 104        | 135                       | 704  | 44    | 883        | 702                   | 18   | 134   | 854        | 11                        | 538  | 93    | 642        | 2483       |
| % Cars                                                     | 100                        | 100  | 100   | 100        | 100                       | 99.4 | 100   | 99.5       | 99.9                  | 100  | 100   | 99.9       | 100                       | 99.8 | 100   | 99.8       | 99.8       |
| Trucks                                                     | 0                          | 0    | 0     | 0          | 0                         | 4    | 0     | 4          | 1                     | 0    | 0     | 1          | 0                         | 1    | 0     | 1          | 6          |
| % Trucks                                                   | 0                          | 0    | 0     | 0          | 0                         | 0.6  | 0     | 0.5        | 0.1                   | 0    | 0     | 0.1        | 0                         | 0.2  | 0     | 0.2        | 0.2        |

Accurate Counts  
978-664-2565

N/S Street : Staples Drive / 2nd Avenue  
E/W Street: Highland Avenue  
City/State : Needham, MA  
Weather : Rain

File Name : 17640004  
Site Code : 17640004  
Start Date : 4/26/2017  
Page No : 4

| Groups Printed: Cars |                            |      |       |                           |      |       |                       |      |       |                           |      |       |            |  |
|----------------------|----------------------------|------|-------|---------------------------|------|-------|-----------------------|------|-------|---------------------------|------|-------|------------|--|
|                      | Staples Drwy<br>From North |      |       | Highland Ave<br>From East |      |       | 2nd Ave<br>From South |      |       | Highland Ave<br>From West |      |       |            |  |
| Start Time           | Left                       | Thru | Right | Left                      | Thru | Right | Left                  | Thru | Right | Left                      | Thru | Right | Int. Total |  |
| 04:00 PM             | 10                         | 3    | 7     | 30                        | 183  | 10    | 148                   | 4    | 27    | 2                         | 119  | 19    | 562        |  |
| 04:15 PM             | 10                         | 3    | 4     | 36                        | 205  | 8     | 136                   | 2    | 31    | 4                         | 135  | 19    | 593        |  |
| 04:30 PM             | 13                         | 6    | 3     | 25                        | 182  | 12    | 165                   | 4    | 35    | 1                         | 134  | 26    | 606        |  |
| 04:45 PM             | 21                         | 6    | 10    | 35                        | 165  | 8     | 157                   | 1    | 30    | 5                         | 138  | 18    | 594        |  |
| Total                | 54                         | 18   | 24    | 126                       | 735  | 38    | 606                   | 11   | 123   | 12                        | 526  | 82    | 2355       |  |
| 05:00 PM             | 13                         | 4    | 8     | 39                        | 203  | 12    | 176                   | 7    | 29    | 2                         | 150  | 30    | 673        |  |
| 05:15 PM             | 15                         | 2    | 3     | 36                        | 154  | 12    | 204                   | 6    | 40    | 3                         | 116  | 19    | 610        |  |
| 05:30 PM             | 16                         | 3    | 8     | 26                        | 162  | 9     | 159                   | 5    | 45    | 1                         | 128  | 20    | 582        |  |
| 05:45 PM             | 8                          | 4    | 6     | 34                        | 154  | 7     | 181                   | 3    | 43    | 0                         | 144  | 22    | 606        |  |
| Total                | 52                         | 13   | 25    | 135                       | 673  | 40    | 720                   | 21   | 157   | 6                         | 538  | 91    | 2471       |  |
| Grand Total          | 106                        | 31   | 49    | 261                       | 1408 | 78    | 1326                  | 32   | 280   | 18                        | 1064 | 173   | 4826       |  |
| Apprch %             | 57                         | 16.7 | 26.3  | 14.9                      | 80.6 | 4.5   | 81                    | 2    | 17.1  | 1.4                       | 84.8 | 13.8  |            |  |
| Total %              | 2.2                        | 0.6  | 1     | 5.4                       | 29.2 | 1.6   | 27.5                  | 0.7  | 5.8   | 0.4                       | 22   | 3.6   |            |  |



978-664-2565

File Name : 17640004  
Site Code : 17640004  
Start Date : 4/26/2017  
Page No : 7

File Name : 17640004  
Site Code : 17640004  
Start Date : 4/26/2017  
Page No : 7

978-664-2565

File Name : 17640004  
Site Code : 17640004  
Start Date : 4/26/2017  
Page No : 10

File Name : 17640004  
Site Code : 17640004  
Start Date : 4/26/2017  
Page No : 10

# **Accurate Counts** 978-664-2565

N/S Street : Driveway / 1st Avenue  
E/W Street: Highland Avenue  
City/State : Needham, MA  
Weather : Rain

File Name : 17640003  
Site Code : 17640003  
Start Date : 4/26/2017  
Page No : 1

| Groups Printed- Cars - Trucks |                    |      |       |                           |      |       |                       |      |       |                           |      |       |            |
|-------------------------------|--------------------|------|-------|---------------------------|------|-------|-----------------------|------|-------|---------------------------|------|-------|------------|
| Start Time                    | Drwy<br>From North |      |       | Highland Ave<br>From East |      |       | 1st Ave<br>From South |      |       | Highland Ave<br>From West |      |       | Int. Total |
|                               | Left               | Thru | Right | Left                      | Thru | Right | Left                  | Thru | Right | Left                      | Thru | Right |            |
| 07:00 AM                      | 0                  | 0    | 0     | 0                         | 154  | 0     | 0                     | 0    | 11    | 0                         | 289  | 81    | 535        |
| 07:15 AM                      | 0                  | 0    | 0     | 1                         | 224  | 0     | 0                     | 0    | 12    | 0                         | 258  | 88    | 583        |
| 07:30 AM                      | 0                  | 0    | 2     | 0                         | 256  | 1     | 0                     | 0    | 10    | 0                         | 243  | 81    | 593        |
| 07:45 AM                      | 0                  | 0    | 1     | 0                         | 269  | 2     | 0                     | 0    | 20    | 0                         | 264  | 119   | 675        |
| Total                         | 0                  | 0    | 3     | 1                         | 903  | 3     | 0                     | 0    | 53    | 0                         | 1054 | 369   | 2386       |
| 08:00 AM                      | 0                  | 0    | 0     | 0                         | 219  | 0     | 0                     | 0    | 15    | 0                         | 227  | 139   | 600        |
| 08:15 AM                      | 0                  | 0    | 2     | 0                         | 234  | 5     | 0                     | 0    | 17    | 0                         | 216  | 140   | 614        |
| 08:30 AM                      | 0                  | 0    | 3     | 1                         | 217  | 3     | 0                     | 0    | 22    | 0                         | 226  | 110   | 582        |
| 08:45 AM                      | 0                  | 0    | 10    | 2                         | 240  | 9     | 0                     | 0    | 23    | 0                         | 285  | 162   | 731        |
| Total                         | 0                  | 0    | 15    | 3                         | 910  | 17    | 0                     | 0    | 77    | 0                         | 954  | 551   | 2527       |
| Grand Total                   | 0                  | 0    | 18    | 4                         | 1813 | 20    | 0                     | 0    | 130   | 0                         | 2008 | 920   | 4913       |
| Apprch %                      | 0                  | 0    | 100   | 0.2                       | 98.7 | 1.1   | 0                     | 0    | 100   | 0                         | 68.6 | 31.4  |            |
| Total %                       | 0                  | 0    | 0.4   | 0.1                       | 36.9 | 0.4   | 0                     | 0    | 2.6   | 0                         | 40.9 | 18.7  |            |
| Cars                          | 0                  | 0    | 18    | 4                         | 1765 | 20    | 0                     | 0    | 125   | 0                         | 1984 | 902   | 4818       |
| % Cars                        | 0                  | 0    | 100   | 100                       | 97.4 | 100   | 0                     | 0    | 96.2  | 0                         | 98.8 | 98    | 98.1       |
| Trucks                        | 0                  | 0    | 0     | 0                         | 48   | 0     | 0                     | 0    | 5     | 0                         | 24   | 18    | 95         |
| % Trucks                      | 0                  | 0    | 0     | 0                         | 2.6  | 0     | 0                     | 0    | 3.8   | 0                         | 1.2  | 2     | 1.9        |

# **Accurate Counts** 978-664-2565

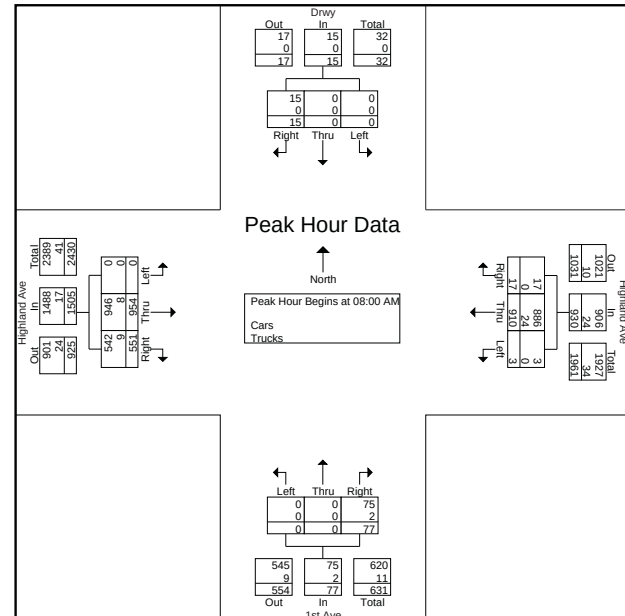
N/S Street : Driveway / 1st Avenue  
E/W Street: Highland Avenue  
City/State : Needham, MA  
Weather : Rain

File Name : 17640003  
Site Code : 17640003  
Start Date : 4/26/2017  
Page No : 2

| Start Time   | Drwy<br>From North |      |       |            | Highland Ave<br>From East |      |       |            | 1st Ave<br>From South |      |       |            | Highland Ave<br>From West |      |       |            | Int. Total |
|--------------|--------------------|------|-------|------------|---------------------------|------|-------|------------|-----------------------|------|-------|------------|---------------------------|------|-------|------------|------------|
|              | Left               | Thru | Right | App. Total | Left                      | Thru | Right | App. Total | Left                  | Thru | Right | App. Total | Left                      | Thru | Right | App. Total |            |
| 07:00 AM     | 0                  | 0    | 0     | 0          | 0                         | 219  | 0     | 219        | 0                     | 0    | 15    | 15         | 0                         | 227  | 139   | 366        | 600        |
| 07:15 AM     | 0                  | 0    | 2     | 2          | 0                         | 234  | 5     | 239        | 0                     | 0    | 17    | 17         | 0                         | 216  | 140   | 356        | 614        |
| 07:30 AM     | 0                  | 0    | 3     | 3          | 1                         | 217  | 3     | 221        | 0                     | 0    | 22    | 22         | 0                         | 226  | 110   | 336        | 582        |
| 07:45 AM     | 0                  | 0    | 10    | 10         | 2                         | 240  | 9     | 251        | 0                     | 0    | 23    | 23         | 0                         | 285  | 162   | 447        | 731        |
| Total Volume | 0                  | 0    | 15    | 15         | 3                         | 910  | 17    | 930        | 0                     | 0    | 77    | 77         | 0                         | 954  | 551   | 1505       | 2527       |
| % App. Total | 0                  | 0    | 100   |            | 0.3                       | 97.8 | 1.8   |            | 0                     | 0    | 100   |            | 0                         | 63.4 | 36.6  |            |            |
| PHF          | .000               | .000 | .375  | .375       | .375                      | .948 | .472  | .926       | .000                  | .000 | .837  | .837       | .000                      | .837 | .850  | .842       | .864       |
| Cars         | 0                  | 0    | 15    | 15         | 3                         | 886  | 17    | 906        | 0                     | 0    | 75    | 75         | 0                         | 946  | 542   | 1488       | 2484       |
| % Cars       | 0                  | 0    | 100   | 100        | 100                       | 97.4 | 100   | 97.4       | 0                     | 0    | 97.4  | 97.4       | 0                         | 99.2 | 98.4  | 98.9       | 98.3       |
| Trucks       | 0                  | 0    | 0     | 0          | 0                         | 24   | 0     | 24         | 0                     | 0    | 2     | 2          | 0                         | 8    | 9     | 17         | 43         |
| % Trucks     | 0                  | 0    | 0     | 0          | 0                         | 2.6  | 0     | 2.6        | 0                     | 0    | 2.6   | 2.6        | 0                         | 0.8  | 1.6   | 1.1        | 1.7        |

Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1

Peak Hour for Entire Intersection Begins at 08:00 AM



**Accurate Counts**  
978-664-2565

N/S Street : Driveway / 1st Avenue  
E/W Street: Highland Avenue  
City/State : Needham, MA  
Weather : Rain

File Name : 17640003  
Site Code : 17640003  
Start Date : 4/26/2017  
Page No : 4

| Groups Printed- Cars |                    |      |       |                           |      |       |                       |      |       |                           |      |       |            |
|----------------------|--------------------|------|-------|---------------------------|------|-------|-----------------------|------|-------|---------------------------|------|-------|------------|
| Start Time           | Drwy<br>From North |      |       | Highland Ave<br>From East |      |       | 1st Ave<br>From South |      |       | Highland Ave<br>From West |      |       | Int. Total |
|                      | Left               | Thru | Right | Left                      | Thru | Right | Left                  | Thru | Right | Left                      | Thru | Right |            |
| 07:00 AM             | 0                  | 0    | 0     | 0                         | 147  | 0     | 0                     | 0    | 11    | 0                         | 286  | 79    | 523        |
| 07:15 AM             | 0                  | 0    | 0     | 1                         | 218  | 0     | 0                     | 0    | 11    | 0                         | 250  | 85    | 565        |
| 07:30 AM             | 0                  | 0    | 2     | 0                         | 251  | 1     | 0                     | 0    | 10    | 0                         | 239  | 80    | 583        |
| 07:45 AM             | 0                  | 0    | 1     | 0                         | 263  | 2     | 0                     | 0    | 18    | 0                         | 263  | 116   | 663        |
| Total                | 0                  | 0    | 3     | 1                         | 879  | 3     | 0                     | 0    | 50    | 0                         | 1038 | 360   | 2334       |
| 08:00 AM             | 0                  | 0    | 0     | 0                         | 214  | 0     | 0                     | 0    | 13    | 0                         | 226  | 136   | 589        |
| 08:15 AM             | 0                  | 0    | 2     | 0                         | 226  | 5     | 0                     | 0    | 17    | 0                         | 213  | 137   | 600        |
| 08:30 AM             | 0                  | 0    | 3     | 1                         | 211  | 3     | 0                     | 0    | 22    | 0                         | 225  | 110   | 575        |
| 08:45 AM             | 0                  | 0    | 10    | 2                         | 235  | 9     | 0                     | 0    | 23    | 0                         | 282  | 159   | 720        |
| Total                | 0                  | 0    | 15    | 3                         | 886  | 17    | 0                     | 0    | 75    | 0                         | 946  | 542   | 2484       |
| Grand Total          | 0                  | 0    | 18    | 4                         | 1765 | 20    | 0                     | 0    | 125   | 0                         | 1984 | 902   | 4818       |
| Apprch %             | 0                  | 0    | 100   | 0.2                       | 98.7 | 1.1   | 0                     | 0    | 100   | 0                         | 68.7 | 31.3  |            |
| Total %              | 0                  | 0    | 0.4   | 0.1                       | 36.6 | 0.4   | 0                     | 0    | 2.6   | 0                         | 41.2 | 18.7  |            |

**Accurate Counts**  
978-664-2565

N/S Street : Driveway / 1st Avenue  
E/W Street: Highland Avenue  
City/State : Needham, MA  
Weather : Rain

File Name : 17640003  
Site Code : 17640003  
Start Date : 4/26/2017  
Page No : 7

| Groups Printed- Trucks |                    |      |       |                           |      |       |                       |      |       |                           |      |       |            |
|------------------------|--------------------|------|-------|---------------------------|------|-------|-----------------------|------|-------|---------------------------|------|-------|------------|
| Start Time             | Drwy<br>From North |      |       | Highland Ave<br>From East |      |       | 1st Ave<br>From South |      |       | Highland Ave<br>From West |      |       | Int. Total |
|                        | Left               | Thru | Right | Left                      | Thru | Right | Left                  | Thru | Right | Left                      | Thru | Right |            |
| 07:00 AM               | 0                  | 0    | 0     | 0                         | 7    | 0     | 0                     | 0    | 0     | 0                         | 3    | 2     | 12         |
| 07:15 AM               | 0                  | 0    | 0     | 0                         | 6    | 0     | 0                     | 0    | 1     | 0                         | 8    | 3     | 18         |
| 07:30 AM               | 0                  | 0    | 0     | 0                         | 5    | 0     | 0                     | 0    | 0     | 0                         | 4    | 1     | 10         |
| 07:45 AM               | 0                  | 0    | 0     | 0                         | 6    | 0     | 0                     | 0    | 2     | 0                         | 1    | 3     | 12         |
| Total                  | 0                  | 0    | 0     | 0                         | 24   | 0     | 0                     | 0    | 3     | 0                         | 16   | 9     | 52         |
| 08:00 AM               | 0                  | 0    | 0     | 0                         | 5    | 0     | 0                     | 0    | 2     | 0                         | 1    | 3     | 11         |
| 08:15 AM               | 0                  | 0    | 0     | 0                         | 8    | 0     | 0                     | 0    | 0     | 0                         | 3    | 3     | 14         |
| 08:30 AM               | 0                  | 0    | 0     | 0                         | 6    | 0     | 0                     | 0    | 0     | 0                         | 1    | 0     | 7          |
| 08:45 AM               | 0                  | 0    | 0     | 0                         | 5    | 0     | 0                     | 0    | 0     | 0                         | 3    | 3     | 11         |
| Total                  | 0                  | 0    | 0     | 0                         | 24   | 0     | 0                     | 0    | 2     | 0                         | 8    | 9     | 43         |
| Grand Total            | 0                  | 0    | 0     | 0                         | 48   | 0     | 0                     | 0    | 5     | 0                         | 24   | 18    | 95         |
| Apprch %               | 0                  | 0    | 0     | 0                         | 100  | 0     | 0                     | 0    | 100   | 0                         | 57.1 | 42.9  |            |
| Total %                | 0                  | 0    | 0     | 0                         | 50.5 | 0     | 0                     | 0    | 5.3   | 0                         | 25.3 | 18.9  |            |



# Accurate Counts 978-664-2565

N/S Street : Driveway / 1st Avenue  
E/W Street: Highland Avenue  
City/State : Needham, MA  
Weather : Rain

File Name : 17640003  
Site Code : 17640003  
Start Date : 4/26/2017  
Page No : 10

| Groups Printed- Bikes, Peds |                    |      |       |      |                           |      |       |      |                       |      |       |      |                           |      |       |      |              |              |            |
|-----------------------------|--------------------|------|-------|------|---------------------------|------|-------|------|-----------------------|------|-------|------|---------------------------|------|-------|------|--------------|--------------|------------|
|                             | Drwy<br>From North |      |       |      | Highland Ave<br>From East |      |       |      | 1st Ave<br>From South |      |       |      | Highland Ave<br>From West |      |       |      |              |              |            |
| Start Time                  | Left               | Thru | Right | Peds | Left                      | Thru | Right | Peds | Left                  | Thru | Right | Peds | Left                      | Thru | Right | Peds | Exclu. Total | Inclu. Total | Int. Total |
| 07:00 AM                    | 0                  | 0    | 0     | 0    | 0                         | 0    | 0     | 0    | 0                     | 0    | 0     | 0    | 0                         | 0    | 0     | 0    | 0            | 0            | 0          |
| 07:15 AM                    | 0                  | 0    | 0     | 0    | 0                         | 0    | 0     | 0    | 0                     | 0    | 0     | 0    | 0                         | 0    | 0     | 0    | 0            | 0            | 0          |
| 07:30 AM                    | 0                  | 0    | 0     | 0    | 0                         | 0    | 0     | 0    | 0                     | 0    | 0     | 0    | 0                         | 0    | 0     | 0    | 0            | 0            | 0          |
| 07:45 AM                    | 0                  | 0    | 0     | 0    | 0                         | 0    | 0     | 1    | 0                     | 0    | 0     | 1    | 0                         | 0    | 0     | 0    | 2            | 0            | 2          |
| Total                       | 0                  | 0    | 0     | 0    | 0                         | 0    | 0     | 1    | 0                     | 0    | 0     | 1    | 0                         | 0    | 0     | 0    | 2            | 0            | 2          |
| 08:00 AM                    | 0                  | 0    | 0     | 0    | 0                         | 0    | 0     | 2    | 0                     | 0    | 0     | 0    | 0                         | 0    | 0     | 0    | 2            | 0            | 2          |
| 08:15 AM                    | 0                  | 0    | 0     | 0    | 0                         | 0    | 0     | 2    | 0                     | 0    | 0     | 1    | 0                         | 1    | 0     | 0    | 3            | 1            | 4          |
| 08:30 AM                    | 0                  | 0    | 0     | 0    | 0                         | 0    | 0     | 2    | 0                     | 0    | 0     | 0    | 0                         | 0    | 0     | 0    | 2            | 0            | 2          |
| 08:45 AM                    | 0                  | 0    | 0     | 0    | 0                         | 0    | 0     | 0    | 0                     | 0    | 0     | 0    | 0                         | 0    | 0     | 0    | 0            | 0            | 0          |
| Total                       | 0                  | 0    | 0     | 0    | 0                         | 0    | 0     | 6    | 0                     | 0    | 0     | 1    | 0                         | 1    | 0     | 0    | 7            | 1            | 8          |
| Grand Total                 | 0                  | 0    | 0     | 0    | 0                         | 0    | 0     | 7    | 0                     | 0    | 0     | 2    | 0                         | 1    | 0     | 0    | 9            | 1            | 10         |
| Apprch %                    | 0                  | 0    | 0     |      | 0                         | 0    | 0     |      | 0                     | 0    | 0     |      | 0                         | 100  | 0     |      |              |              |            |
| Total %                     | 0                  | 0    | 0     |      | 0                         | 0    | 0     |      | 0                     | 0    | 0     |      | 0                         | 100  | 0     |      | 90           | 10           |            |

# Accurate Counts 978-664-2565

N/S Street : Driveway / 1st Avenue  
E/W Street: Highland Avenue  
City/State : Needham, MA  
Weather : Rain

File Name : 17640003  
Site Code : 17640003  
Start Date : 4/26/2017  
Page No : 1

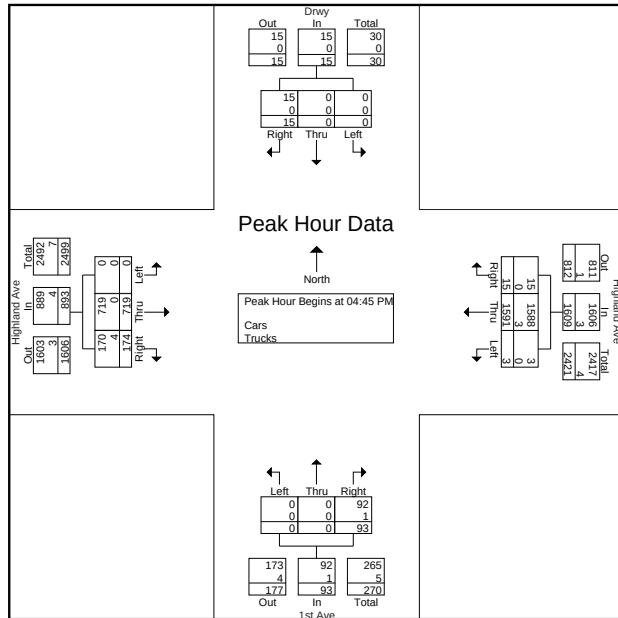
| Groups Printed- Cars - Trucks |                    |      |       |                           |      |       |                       |      |       |                           |      |       |            |
|-------------------------------|--------------------|------|-------|---------------------------|------|-------|-----------------------|------|-------|---------------------------|------|-------|------------|
|                               | Drwy<br>From North |      |       | Highland Ave<br>From East |      |       | 1st Ave<br>From South |      |       | Highland Ave<br>From West |      |       | Int. Total |
| Start Time                    | Left               | Thru | Right | Left                      | Thru | Right | Left                  | Thru | Right | Left                      | Thru | Right | Int. Total |
| 04:00 PM                      | 0                  | 1    | 2     | 1                         | 378  | 2     | 0                     | 0    | 19    | 0                         | 162  | 29    | 594        |
| 04:15 PM                      | 0                  | 0    | 4     | 0                         | 370  | 8     | 0                     | 0    | 15    | 0                         | 166  | 30    | 593        |
| 04:30 PM                      | 0                  | 0    | 4     | 2                         | 394  | 1     | 0                     | 0    | 15    | 0                         | 165  | 24    | 605        |
| 04:45 PM                      | 0                  | 0    | 3     | 3                         | 363  | 6     | 0                     | 0    | 15    | 0                         | 171  | 41    | 602        |
| Total                         | 0                  | 1    | 13    | 6                         | 1505 | 17    | 0                     | 0    | 64    | 0                         | 664  | 124   | 2394       |
| 05:00 PM                      | 0                  | 0    | 5     | 0                         | 431  | 6     | 0                     | 0    | 25    | 0                         | 192  | 45    | 704        |
| 05:15 PM                      | 0                  | 0    | 6     | 0                         | 417  | 2     | 0                     | 0    | 32    | 0                         | 199  | 41    | 697        |
| 05:30 PM                      | 0                  | 0    | 1     | 0                         | 380  | 1     | 0                     | 0    | 21    | 0                         | 157  | 47    | 607        |
| 05:45 PM                      | 0                  | 0    | 2     | 0                         | 364  | 1     | 0                     | 0    | 19    | 0                         | 155  | 47    | 588        |
| Total                         | 0                  | 0    | 14    | 0                         | 1592 | 10    | 0                     | 0    | 97    | 0                         | 703  | 180   | 2596       |
| Grand Total                   | 0                  | 1    | 27    | 6                         | 3097 | 27    | 0                     | 0    | 161   | 0                         | 1367 | 304   | 4990       |
| Apprch %                      | 0                  | 3.6  | 96.4  | 0.2                       | 98.9 | 0.9   | 0                     | 0    | 100   | 0                         | 81.8 | 18.2  |            |
| Total %                       | 0                  | 0    | 0.5   | 0.1                       | 62.1 | 0.5   | 0                     | 0    | 3.2   | 0                         | 27.4 | 6.1   |            |
| Cars                          | 0                  | 1    | 27    | 6                         | 3089 | 27    | 0                     | 0    | 160   | 0                         | 1366 | 298   | 4974       |
| % Cars                        | 0                  | 100  | 100   | 100                       | 99.7 | 100   | 0                     | 0    | 99.4  | 0                         | 99.9 | 98    | 99.7       |
| Trucks                        | 0                  | 0    | 0     | 0                         | 8    | 0     | 0                     | 0    | 1     | 0                         | 1    | 6     | 16         |
| % Trucks                      | 0                  | 0    | 0     | 0                         | 0.3  | 0     | 0                     | 0    | 0.6   | 0                         | 0.1  | 2     | 0.3        |

# **Accurate Counts** 978-664-2565

N/S Street : Driveway / 1st Avenue  
E/W Street: Highland Avenue  
City/State : Needham, MA  
Weather : Rain

File Name : 17640003  
Site Code : 17640003  
Start Date : 4/26/2017  
Page No : 2

|                                                            | Drwy<br>From North |      |       |            | Highland Ave<br>From East |      |       |            | 1st Ave<br>From South |      |       |            | Highland Ave<br>From West |      |       |            |            |
|------------------------------------------------------------|--------------------|------|-------|------------|---------------------------|------|-------|------------|-----------------------|------|-------|------------|---------------------------|------|-------|------------|------------|
| Start Time                                                 | Left               | Thru | Right | App. Total | Left                      | Thru | Right | App. Total | Left                  | Thru | Right | App. Total | Left                      | Thru | Right | App. Total | Int. Total |
| Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1 |                    |      |       |            |                           |      |       |            |                       |      |       |            |                           |      |       |            |            |
| Peak Hour for Entire Intersection Begins at 04:45 PM       |                    |      |       |            |                           |      |       |            |                       |      |       |            |                           |      |       |            |            |
| 04:45 PM                                                   | 0                  | 0    | 3     | 3          | 3                         | 363  | 6     | 372        | 0                     | 0    | 15    | 15         | 0                         | 171  | 41    | 212        | 602        |
| 05:00 PM                                                   | 0                  | 0    | 5     | 5          | 0                         | 431  | 6     | 437        | 0                     | 0    | 25    | 25         | 0                         | 192  | 45    | 237        | 704        |
| 05:15 PM                                                   | 0                  | 0    | 6     | 6          | 0                         | 417  | 2     | 419        | 0                     | 0    | 32    | 32         | 0                         | 199  | 41    | 240        | 697        |
| 05:30 PM                                                   | 0                  | 0    | 1     | 1          | 0                         | 380  | 1     | 381        | 0                     | 0    | 21    | 21         | 0                         | 157  | 47    | 204        | 607        |
| Total Volume                                               | 0                  | 0    | 15    | 15         | 3                         | 1591 | 15    | 1609       | 0                     | 0    | 93    | 93         | 0                         | 719  | 174   | 893        | 2610       |
| % App. Total                                               | 0                  | 0    | 100   |            | 0.2                       | 98.9 | 0.9   |            | 0                     | 0    | 100   |            | 0                         | 80.5 | 19.5  |            |            |
| PHF                                                        | .000               | .000 | .625  | .625       | .250                      | .923 | .625  | .920       | .000                  | .000 | .727  | .727       | .000                      | .903 | .926  | .930       | .927       |
| Cars                                                       | 0                  | 0    | 15    | 15         | 3                         | 1588 | 15    | 1606       | 0                     | 0    | 92    | 92         | 0                         | 719  | 170   | 889        | 2602       |
| % Cars                                                     | 0                  | 0    | 100   | 100        | 100                       | 99.8 | 100   | 99.8       | 0                     | 0    | 98.9  | 98.9       | 0                         | 100  | 97.7  | 99.6       | 99.7       |
| Trucks                                                     | 0                  | 0    | 0     | 0          | 0                         | 3    | 0     | 3          | 0                     | 0    | 1     | 1          | 0                         | 0    | 4     | 4          | 8          |
| % Trucks                                                   | 0                  | 0    | 0     | 0          | 0                         | 0.2  | 0     | 0.2        | 0                     | 0    | 1.1   | 1.1        | 0                         | 0    | 2.3   | 0.4        | 0.3        |



# **Accurate Counts** 978-664-2565

N/S Street : Driveway / 1st Avenue  
E/W Street: Highland Avenue  
City/State : Needham, MA  
Weather : Rain

File Name : 17640003  
Site Code : 17640003  
Start Date : 4/26/2017  
Page No : 4

|             | Drwy<br>From North |      |       |  | Highland Ave<br>From East |      |       |  | 1st Ave<br>From South |      |       |  | Highland Ave<br>From West |      |       |  |            |
|-------------|--------------------|------|-------|--|---------------------------|------|-------|--|-----------------------|------|-------|--|---------------------------|------|-------|--|------------|
| Start Time  | Left               | Thru | Right |  | Left                      | Thru | Right |  | Left                  | Thru | Right |  | Left                      | Thru | Right |  | Int. Total |
| 04:00 PM    | 0                  | 1    | 2     |  | 1                         | 376  | 2     |  | 0                     | 0    | 19    |  | 0                         | 162  | 28    |  | 591        |
| 04:15 PM    | 0                  | 0    | 4     |  | 0                         | 368  | 8     |  | 0                     | 0    | 15    |  | 0                         | 165  | 29    |  | 589        |
| 04:30 PM    | 0                  | 0    | 4     |  | 2                         | 393  | 1     |  | 0                     | 0    | 15    |  | 0                         | 165  | 24    |  | 604        |
| 04:45 PM    | 0                  | 0    | 3     |  | 3                         | 360  | 6     |  | 0                     | 0    | 15    |  | 0                         | 171  | 39    |  | 597        |
| Total       | 0                  | 1    | 13    |  | 6                         | 1497 | 17    |  | 0                     | 0    | 64    |  | 0                         | 663  | 120   |  | 2381       |
| 05:00 PM    | 0                  | 0    | 5     |  | 0                         | 431  | 6     |  | 0                     | 0    | 24    |  | 0                         | 192  | 44    |  | 702        |
| 05:15 PM    | 0                  | 0    | 6     |  | 0                         | 417  | 2     |  | 0                     | 0    | 32    |  | 0                         | 199  | 40    |  | 696        |
| 05:30 PM    | 0                  | 0    | 1     |  | 0                         | 380  | 1     |  | 0                     | 0    | 21    |  | 0                         | 157  | 47    |  | 607        |
| 05:45 PM    | 0                  | 0    | 2     |  | 0                         | 364  | 1     |  | 0                     | 0    | 19    |  | 0                         | 155  | 47    |  | 588        |
| Total       | 0                  | 0    | 14    |  | 0                         | 1592 | 10    |  | 0                     | 0    | 96    |  | 0                         | 703  | 178   |  | 2593       |
| Grand Total | 0                  | 1    | 27    |  | 6                         | 3089 | 27    |  | 0                     | 0    | 160   |  | 0                         | 1366 | 298   |  | 4974       |
| Apprch %    | 0                  | 3.6  | 96.4  |  | 0.2                       | 98.9 | 0.9   |  | 0                     | 0    | 100   |  | 0                         | 82.1 | 17.9  |  |            |
| Total %     | 0                  | 0    | 0.5   |  | 0.1                       | 62.1 | 0.5   |  | 0                     | 0    | 3.2   |  | 0                         | 27.5 | 6     |  |            |

978-664-2565

File Name : 17640003  
Site Code : 17640003  
Start Date : 4/26/2017  
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| Groups Printed- Trucks |                 |      |       |                        |      |       |                    |      |       |                        |      |       |            |  |
|------------------------|-----------------|------|-------|------------------------|------|-------|--------------------|------|-------|------------------------|------|-------|------------|--|
| Start Time             | Drwy From North |      |       | Highland Ave From East |      |       | 1st Ave From South |      |       | Highland Ave From West |      |       | Int. Total |  |
|                        | Left            | Thru | Right | Left                   | Thru | Right | Left               | Thru | Right | Left                   | Thru | Right |            |  |
| 04:00 PM               | 0               | 0    | 0     | 0                      | 2    | 0     | 0                  | 0    | 0     | 0                      | 0    | 1     | 3          |  |
| 04:15 PM               | 0               | 0    | 0     | 0                      | 2    | 0     | 0                  | 0    | 0     | 0                      | 1    | 1     | 4          |  |
| 04:30 PM               | 0               | 0    | 0     | 0                      | 1    | 0     | 0                  | 0    | 0     | 0                      | 0    | 0     | 1          |  |
| 04:45 PM               | 0               | 0    | 0     | 0                      | 3    | 0     | 0                  | 0    | 0     | 0                      | 0    | 2     | 5          |  |
| Total                  | 0               | 0    | 0     | 0                      | 8    | 0     | 0                  | 0    | 0     | 0                      | 1    | 4     | 13         |  |
| 05:00 PM               | 0               | 0    | 0     | 0                      | 0    | 0     | 0                  | 0    | 1     | 0                      | 0    | 1     | 2          |  |
| 05:15 PM               | 0               | 0    | 0     | 0                      | 0    | 0     | 0                  | 0    | 0     | 0                      | 0    | 1     | 1          |  |
| 05:30 PM               | 0               | 0    | 0     | 0                      | 0    | 0     | 0                  | 0    | 0     | 0                      | 0    | 0     | 0          |  |
| 05:45 PM               | 0               | 0    | 0     | 0                      | 0    | 0     | 0                  | 0    | 0     | 0                      | 0    | 0     | 0          |  |
| Total                  | 0               | 0    | 0     | 0                      | 0    | 0     | 0                  | 0    | 1     | 0                      | 0    | 2     | 3          |  |
| Grand Total            | 0               | 0    | 0     | 0                      | 8    | 0     | 0                  | 0    | 1     | 0                      | 1    | 6     | 16         |  |
| Apprch %               | 0               | 0    | 0     | 0                      | 100  | 0     | 0                  | 0    | 100   | 0                      | 14.3 | 85.7  |            |  |
| Total %                | 0               | 0    | 0     | 0                      | 50   | 0     | 0                  | 0    | 6.2   | 0                      | 6.2  | 37.5  |            |  |

978-664-2565

File Name : 17640003  
Site Code : 17640003  
Start Date : 4/26/2017  
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| Groups Printed- Bikes_ Peds |                 |      |       |      |                        |      |       |      |                    |      |       |      |                        |      |       |      |              |              |            |   |   |
|-----------------------------|-----------------|------|-------|------|------------------------|------|-------|------|--------------------|------|-------|------|------------------------|------|-------|------|--------------|--------------|------------|---|---|
|                             | Drwy From North |      |       |      | Highland Ave From East |      |       |      | 1st Ave From South |      |       |      | Highland Ave From West |      |       |      |              |              |            |   |   |
| Start Time                  | Left            | Thru | Right | Peds | Left                   | Thru | Right | Peds | Left               | Thru | Right | Peds | Left                   | Thru | Right | Peds | Excls. Total | Inclu. Total | Int. Total |   |   |
| 04:00 PM                    | 0               | 0    | 0     | 0    | 0                      | 0    | 0     | 0    | 1                  | 0    | 0     | 0    | 0                      | 2    | 0     | 0    | 0            | 0            | 3          | 0 | 3 |
| 04:15 PM                    | 0               | 0    | 0     | 0    | 0                      | 0    | 0     | 0    | 0                  | 0    | 0     | 0    | 0                      | 0    | 0     | 0    | 0            | 0            | 0          | 0 | 0 |
| 04:30 PM                    | 0               | 0    | 0     | 0    | 0                      | 0    | 0     | 0    | 0                  | 0    | 0     | 0    | 1                      | 0    | 0     | 0    | 0            | 1            | 0          | 1 | 1 |
| 04:45 PM                    | 0               | 0    | 0     | 0    | 0                      | 0    | 0     | 0    | 0                  | 0    | 0     | 0    | 0                      | 0    | 0     | 0    | 0            | 0            | 0          | 0 | 0 |
| Total                       | 0               | 0    | 0     | 0    | 0                      | 0    | 0     | 0    | 1                  | 0    | 0     | 0    | 0                      | 3    | 0     | 0    | 0            | 0            | 4          | 0 | 4 |
|                             |                 |      |       |      |                        |      |       |      |                    |      |       |      |                        |      |       |      |              |              |            |   |   |
| 05:00 PM                    | 0               | 0    | 0     | 0    | 0                      | 0    | 0     | 0    | 2                  | 0    | 0     | 0    | 0                      | 0    | 0     | 0    | 0            | 2            | 0          | 2 | 2 |
| 05:15 PM                    | 0               | 0    | 0     | 0    | 0                      | 0    | 0     | 0    | 0                  | 0    | 0     | 0    | 0                      | 0    | 0     | 0    | 0            | 0            | 0          | 0 | 0 |
| 05:30 PM                    | 0               | 0    | 0     | 0    | 0                      | 0    | 0     | 0    | 0                  | 0    | 0     | 0    | 0                      | 0    | 0     | 0    | 0            | 0            | 0          | 0 | 0 |
| 05:45 PM                    | 0               | 0    | 0     | 0    | 0                      | 0    | 0     | 0    | 1                  | 0    | 0     | 0    | 0                      | 0    | 0     | 0    | 0            | 1            | 0          | 1 | 1 |
| Total                       | 0               | 0    | 0     | 0    | 0                      | 0    | 0     | 0    | 3                  | 0    | 0     | 0    | 0                      | 0    | 0     | 0    | 0            | 3            | 0          | 3 | 3 |
|                             |                 |      |       |      |                        |      |       |      |                    |      |       |      |                        |      |       |      |              |              |            |   |   |
| Grand Total                 | 0               | 0    | 0     | 0    | 0                      | 0    | 0     | 0    | 4                  | 0    | 0     | 0    | 0                      | 3    | 0     | 0    | 0            | 0            | 7          | 0 | 7 |
| Apprch %                    | 0               | 0    | 0     |      | 0                      | 0    | 0     |      |                    | 0    | 0     | 0    |                        |      | 0     | 0    | 0            |              |            |   |   |
| Total %                     |                 |      |       |      |                        |      |       |      |                    |      |       |      |                        |      |       |      | 100          |              | 0          |   |   |

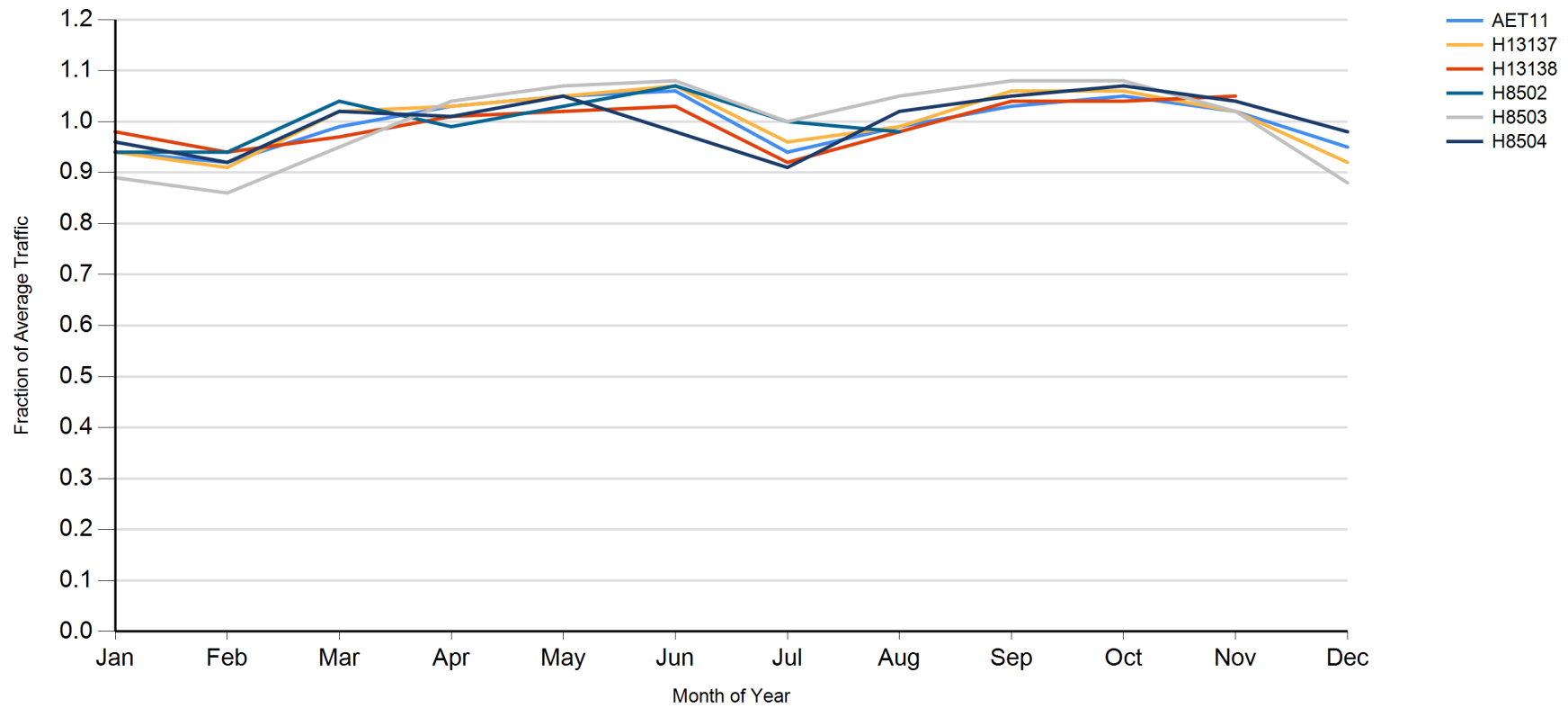






Traffic Pattern by Month for 1/1/2017 - 12/31/2017

Criteria: Location ID = 41, 6161, 6345, 4165, 415, H8504, 32, H8503, H8502, H8501, H8500, H8499, H13137, H13138, H13139, H13140, AET11



Count Seasonal Data  
 From Mass Highway Department  
 Traffic Pattern by Month for 1/1/2017 - 12/31/2017

|                    |        | January | February | March | April | May   | June  | July  | August | September | October | November | December |
|--------------------|--------|---------|----------|-------|-------|-------|-------|-------|--------|-----------|---------|----------|----------|
| U1-Boston          | AET11  | 0.940   | 0.921    | 0.994 | 1.029 | 1.051 | 1.062 | 0.943 | 0.994  | 1.029     | 1.052   | 1.022    | 0.952    |
| U1-Boston          | H13137 | 0.937   | 0.906    | 1.016 | 1.033 | 1.054 | 1.067 | 0.956 | 0.987  | 1.060     | 1.059   | 1.015    | 0.918    |
| U1-Boston          | H13138 | 0.981   | 0.939    | 0.970 | 1.014 | 1.024 | 1.028 | 0.924 | 0.979  | 1.042     | 1.036   | 1.048    |          |
| U1-Boston          | H8502  | 0.942   | 0.938    | 1.035 | 0.986 | 1.032 | 1.070 | 1.000 | 0.983  |           |         |          |          |
| U1-Boston          | H8503  | 0.895   | 0.863    | 0.951 | 1.037 | 1.075 | 1.082 | 0.997 | 1.052  | 1.077     | 1.081   | 1.015    | 0.879    |
| U1-Boston          | H8504  | 0.956   | 0.922    | 1.024 | 1.012 | 1.049 | 0.983 | 0.906 | 1.018  | 1.047     | 1.073   | 1.043    | 0.975    |
| Average:           |        | 0.942   | 0.915    | 0.998 | 1.019 | 1.048 | 1.049 | 0.954 | 1.002  | 1.051     | 1.060   | 1.029    | 0.931    |
| Adjustment Factor: |        | 1.062   | 1.093    |       | n/a   | n/a   |       |       |        |           | n/a     |          |          |

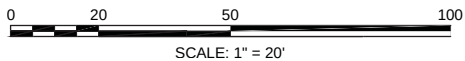






|                  |                    |           |              |
|------------------|--------------------|-----------|--------------|
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| MA               | -                  | 154       | 364          |
| PROJECT FILE NO. |                    | 606635    |              |

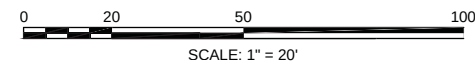
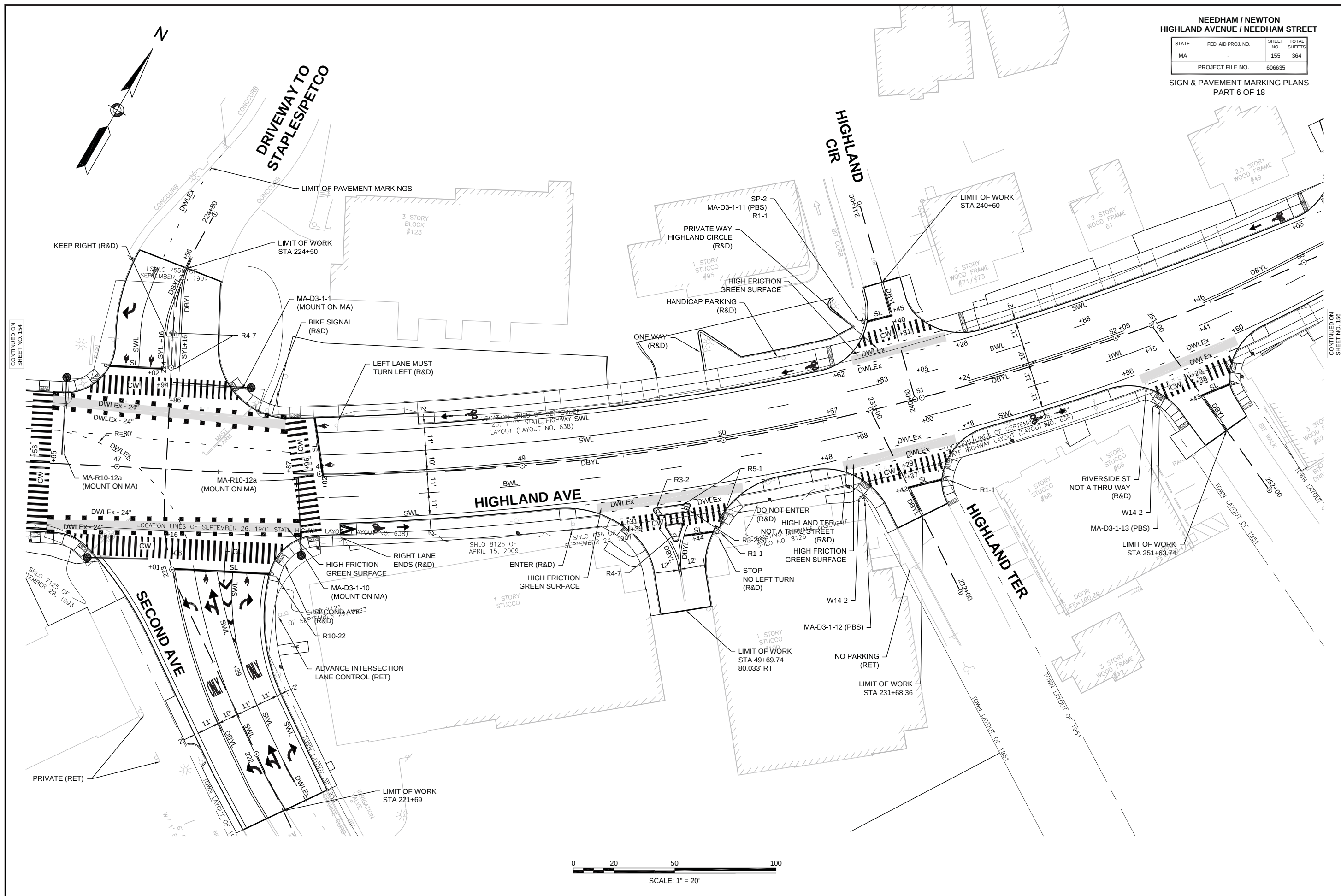
CONTINUED ON  
SHEET NO. 155



NEEDHAM / NEWTON  
HIGHLAND AVENUE / NEEDHAM STREET

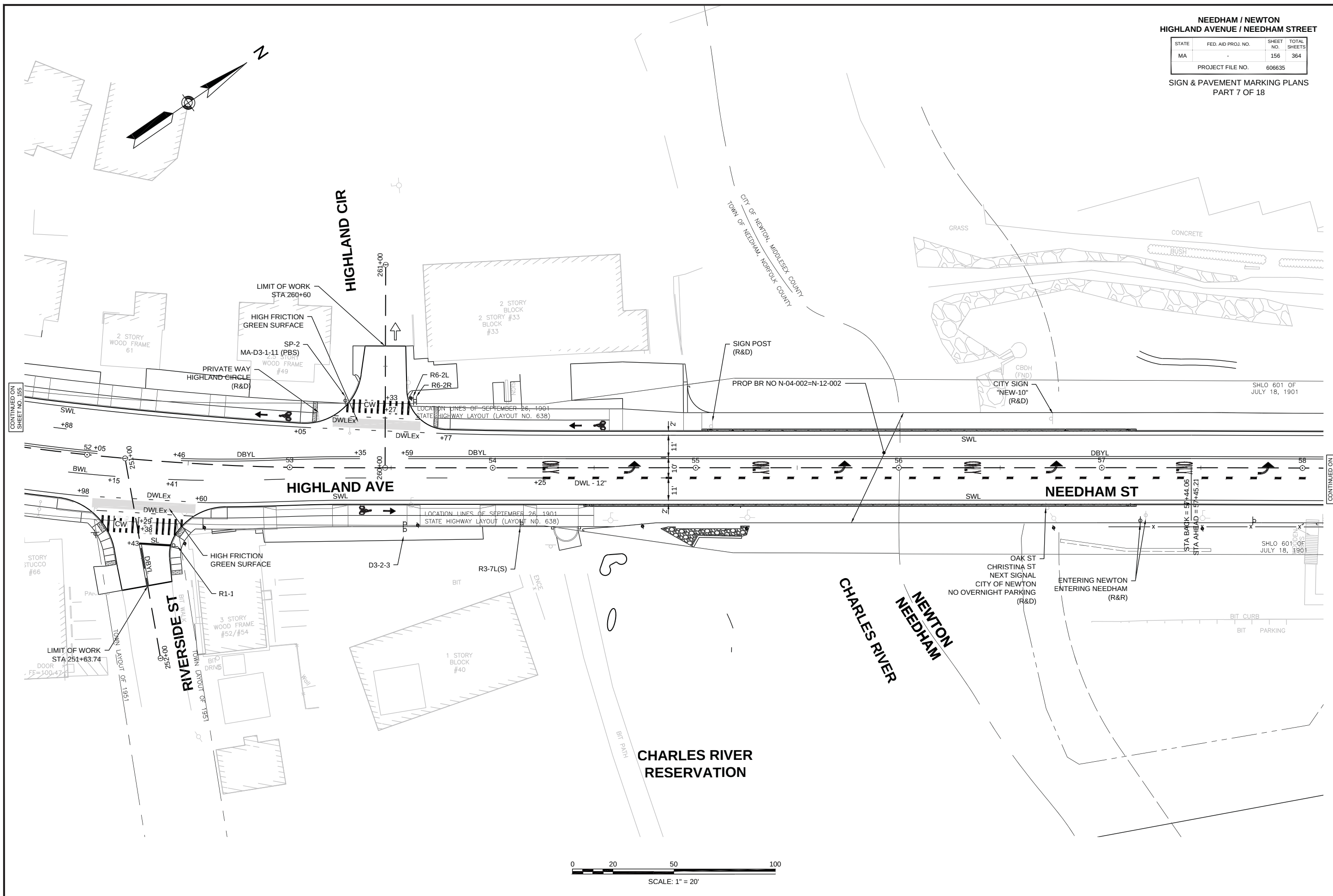
| STATE            | FED. AID PROJ. NO. | SHEET NO. | TOTAL SHEETS |
|------------------|--------------------|-----------|--------------|
| MA               |                    | 155       | 364          |
| PROJECT FILE NO. |                    | 606635    |              |

SIGN & PAVEMENT MARKING PLANS  
PART 6 OF 18



|                  |                    |           |              |
|------------------|--------------------|-----------|--------------|
| STATE            | FED. AID PROJ. NO. | SHEET NO. | TOTAL SHEETS |
| MA               | -                  | 156       | 364          |
| PROJECT FILE NO. |                    | 606635    |              |

606635 TR(PAVEMARK).DWG Plotted on 4-May-2018 4:16 PM

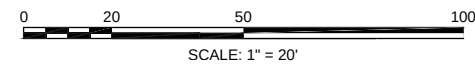
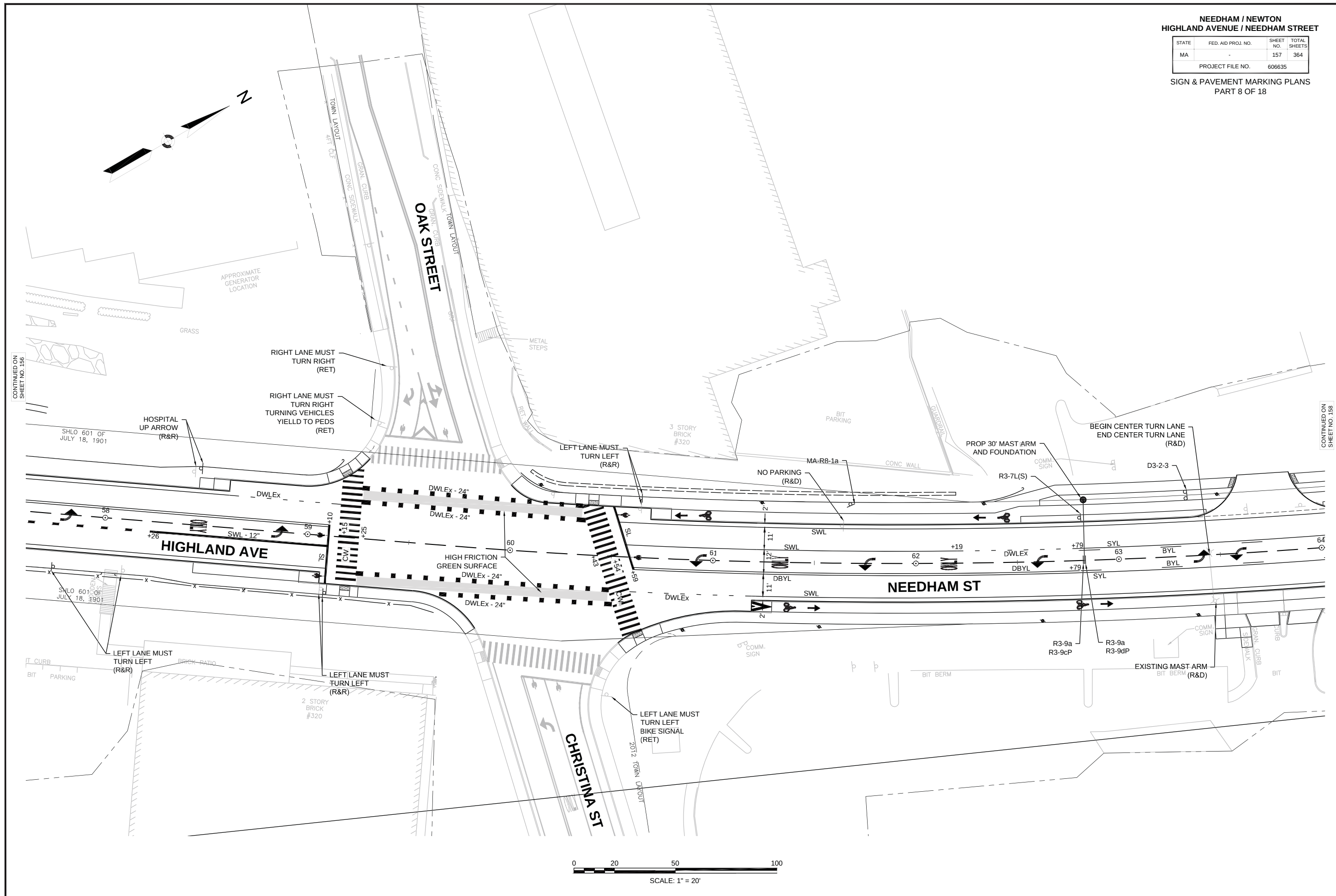




NEEDHAM / NEWTON  
HIGHLAND AVENUE / NEEDHAM STREET

| STATE            | FED. AID PROJ. NO. | SHEET NO. | TOTAL SHEETS |
|------------------|--------------------|-----------|--------------|
| MA               | -                  | 157       | 364          |
| PROJECT FILE NO. |                    | 606635    |              |

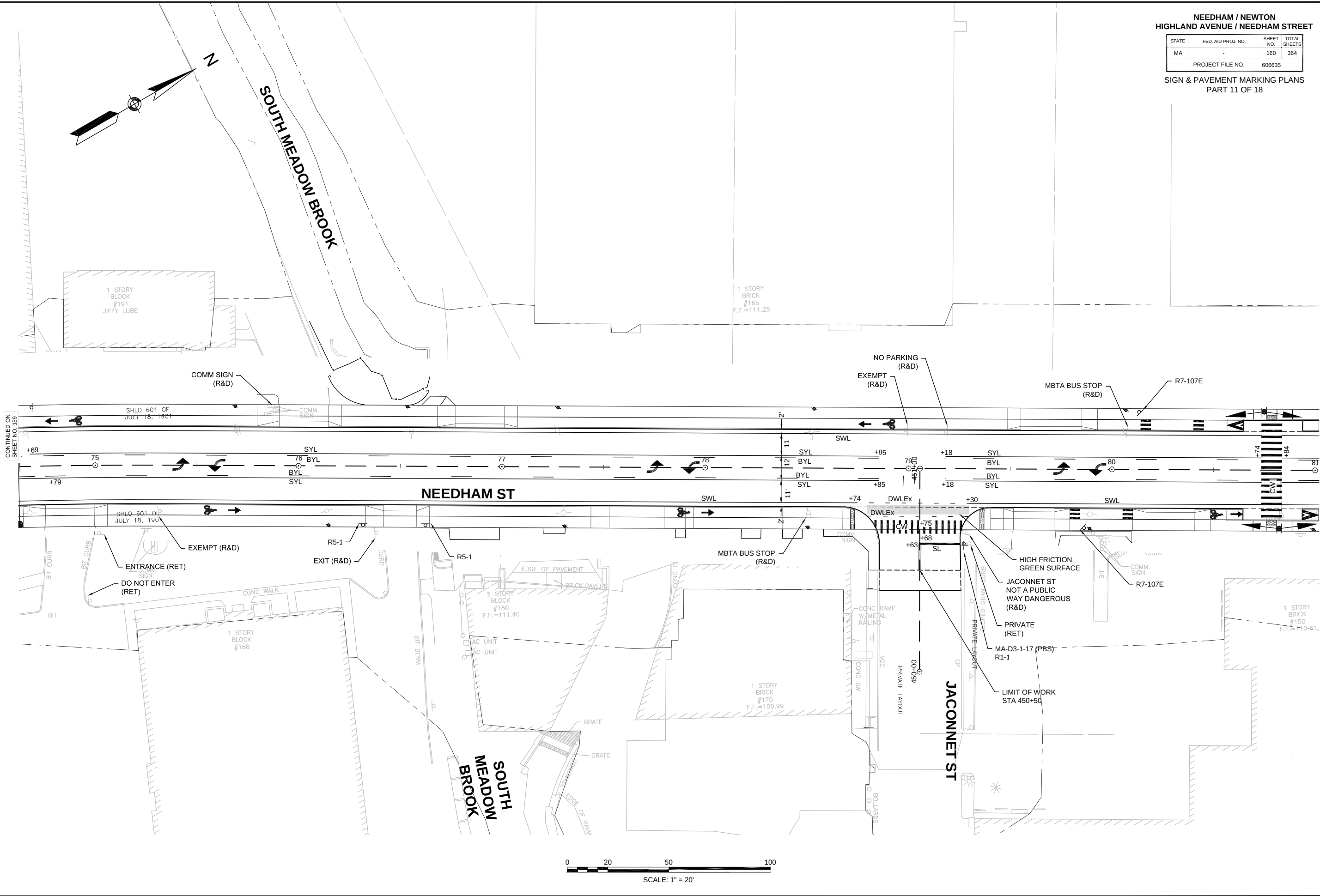
SIGN & PAVEMENT MARKING PLANS  
PART 8 OF 18

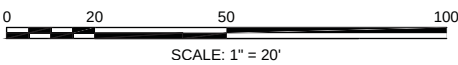
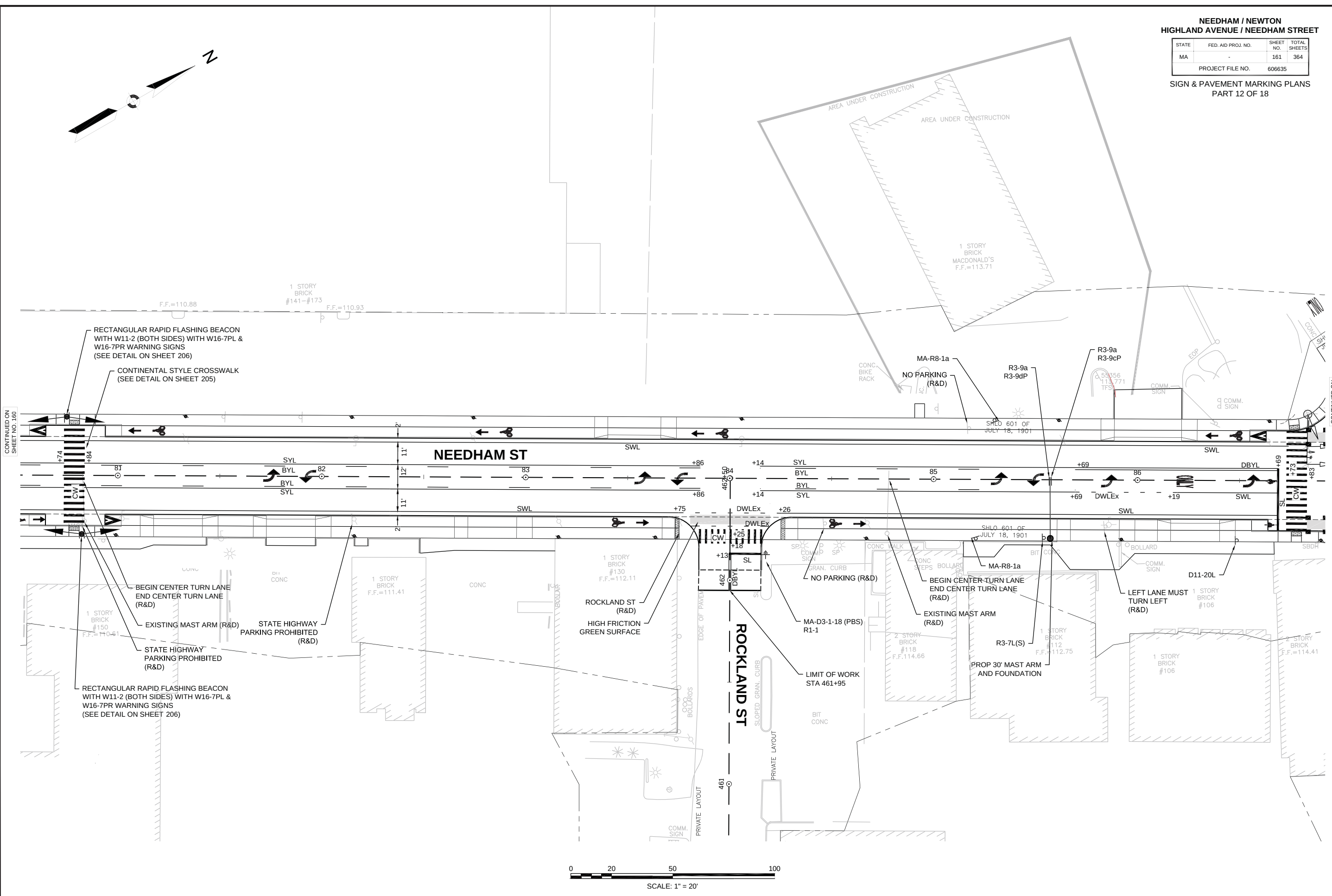












CONTINUED ON  
SHEET NO. 160

CONTINUED ON  
SHEET NO. 162

|                  |                    |           |              |
|------------------|--------------------|-----------|--------------|
| STATE            | FED. AID PROJ. NO. | SHEET NO. | TOTAL SHEETS |
| MA               | -                  | 162       | 364          |
| PROJECT FILE NO. |                    | 606635    |              |

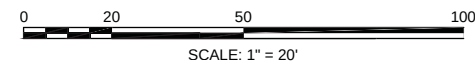
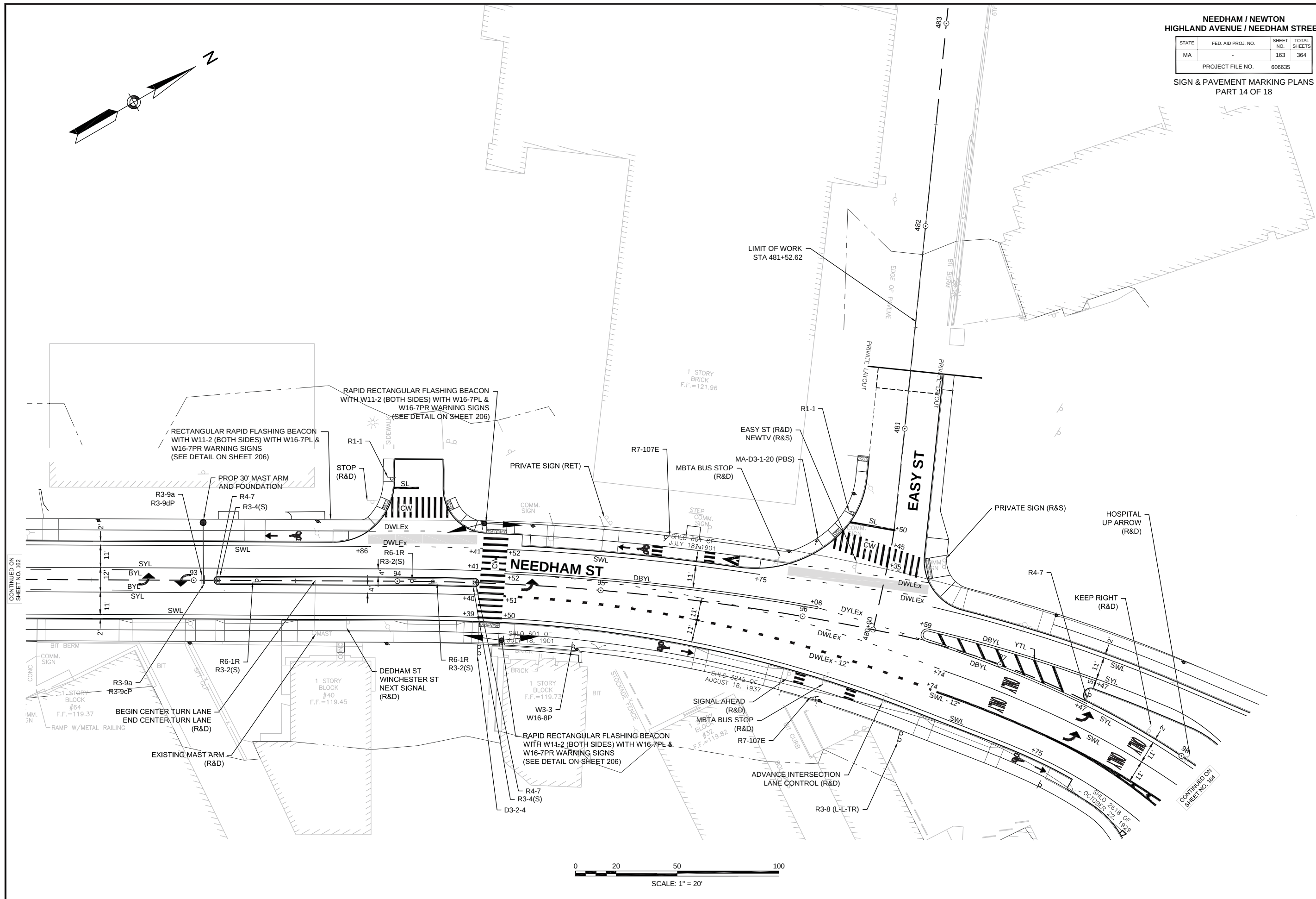
606635 TR(PAVEMARK).DWG Plotted on 4-May-2018 4:19 PM



NEEDHAM / NEWTON  
HIGHLAND AVENUE / NEEDHAM STREET

| STATE            | FED. AID PROJ. NO. | SHEET NO. | TOTAL SHEETS |
|------------------|--------------------|-----------|--------------|
| MA               |                    | 163       | 364          |
| PROJECT FILE NO. |                    | 606635    |              |

SIGN & PAVEMENT MARKING PLANS  
PART 14 OF 18





NEEDHAM / NEWTON  
HIGHLAND AVENUE / NEEDHAM STREET

| STATE            | FED. AID PROJ. NO. | SHEET NO. | TOTAL SHEETS |
|------------------|--------------------|-----------|--------------|
| MA               |                    | 164       | 364          |
| PROJECT FILE NO. |                    | 606635    |              |

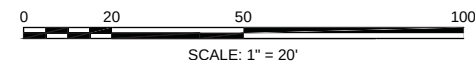
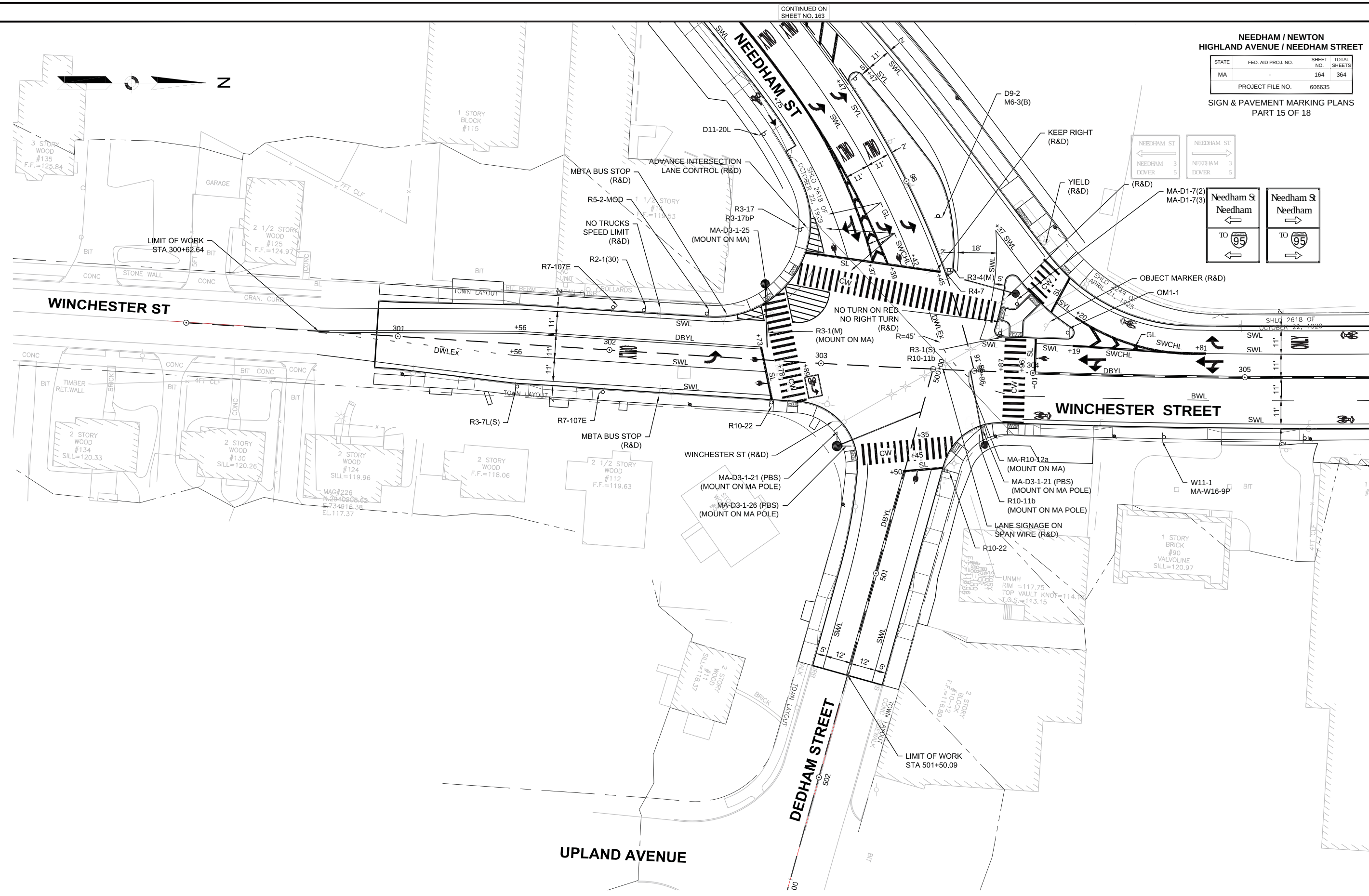
SIGN & PAVEMENT MARKING PLANS  
PART 15 OF 18

NEEDHAM ST  
NEEDHAM ST  
DOVER 5

NEEDHAM ST  
NEEDHAM ST  
DOVER 5

Needham St  
Needham St  
TO 95

Needham St  
Needham St  
TO 95

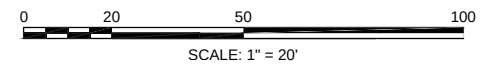
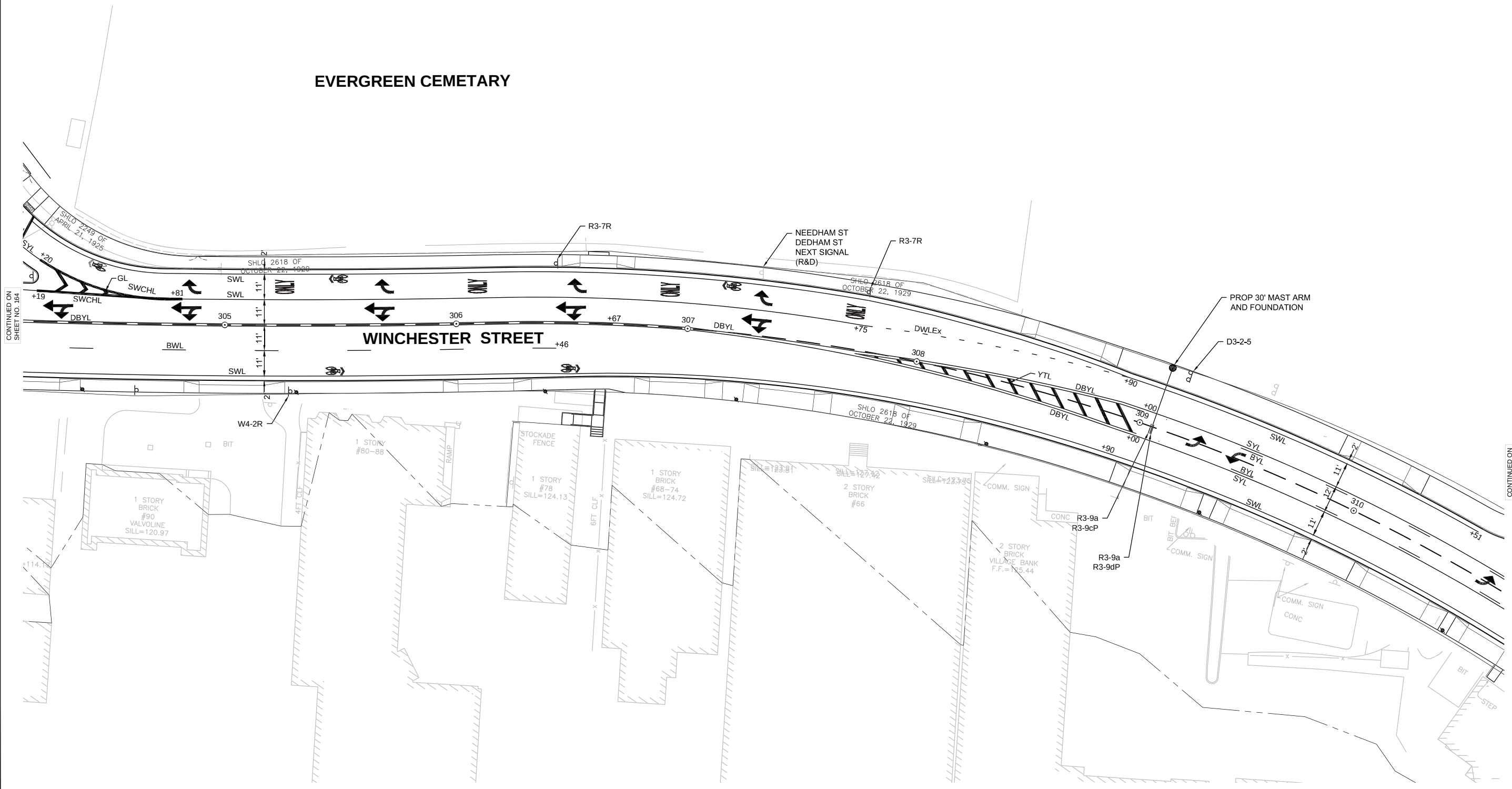


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SHEET NO. 165



EVERGREEN CEMETARY

WINCHESTER STREET



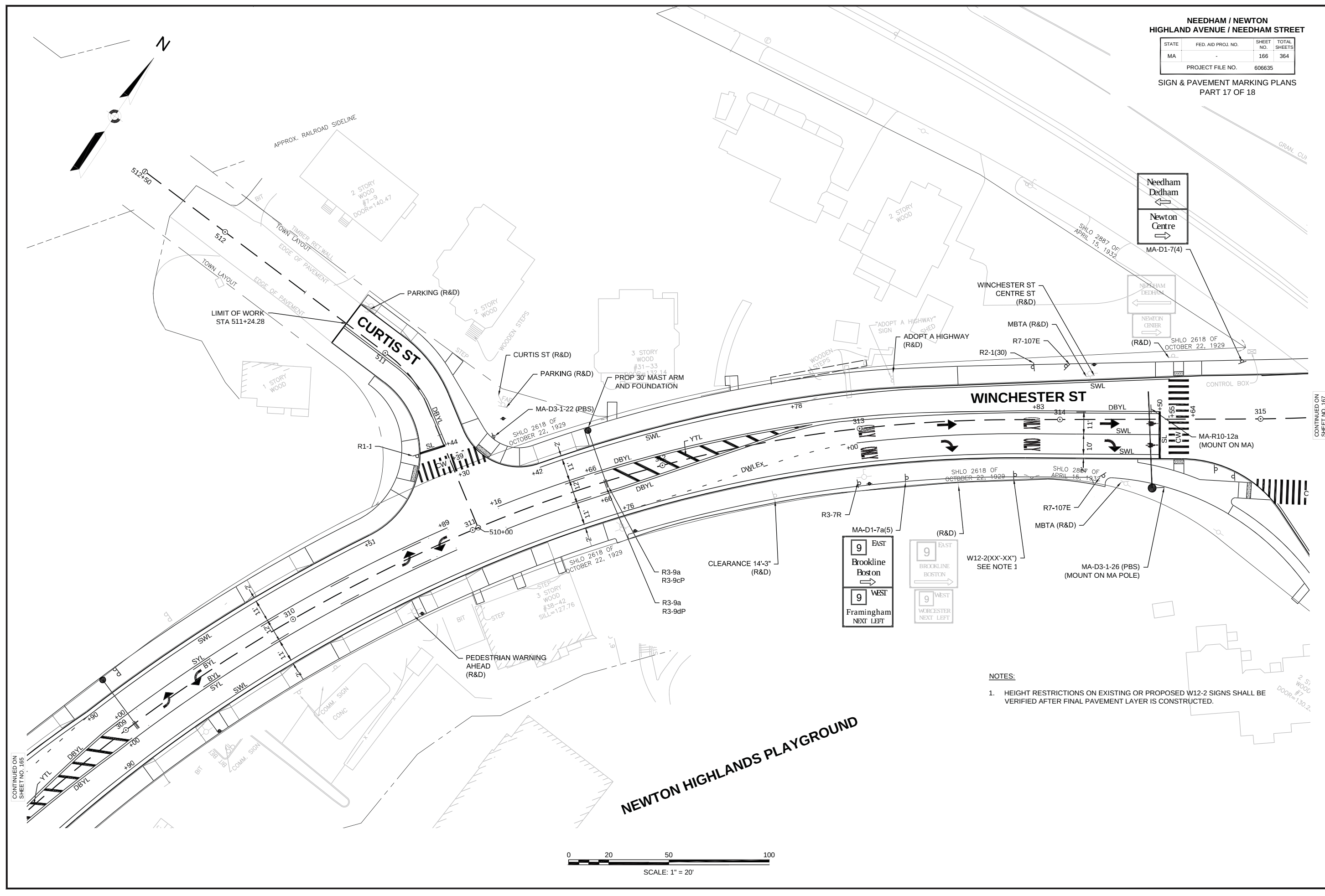
CONTINUED ON  
SHEET NO. 164

CONTINUED ON  
SHEET NO. 166

NEEDHAM / NEWTON  
HIGHLAND AVENUE / NEEDHAM STREET

| STATE            | FED. AID PROJ. NO. | SHEET NO. | TOTAL SHEETS |
|------------------|--------------------|-----------|--------------|
| MA               | -                  | 166       | 364          |
| PROJECT FILE NO. |                    | 606635    |              |

SIGN & PAVEMENT MARKING PLANS  
PART 17 OF 18



NOTES:

1. HEIGHT RESTRICTIONS ON EXISTING OR PROPOSED W12-2 SIGNS SHALL BE VERIFIED AFTER FINAL PAVEMENT LAYER IS CONSTRUCTED.

CONTINUED ON  
SHEET NO. 167

CONTINUED ON  
SHEET NO. 165



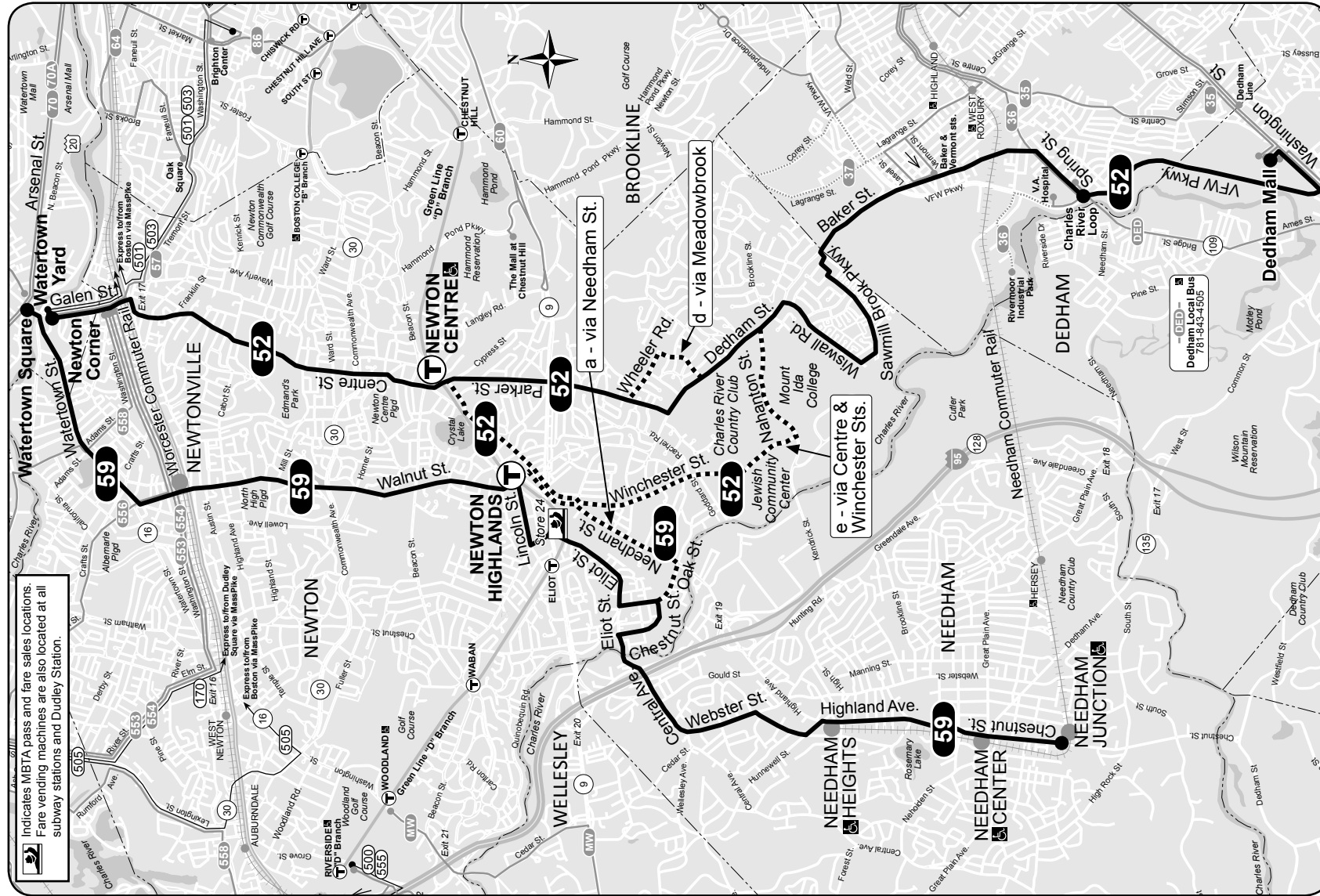








# Route 52 Dedham Mall or Charles River Loop - Watertown Yard Route 59 Needham Junction - Watertown Square



# 52•59

Effective September 2, 2018

**52** Dedham Mall or Charles River Loop-  
Watertown Yard

**59** Needham Junction-Watertown Square

Serving

- Newton Center
- Oak Hill
- Newton Corner
- Jewish Community Center
- BC Law School
- Needham Center
- Needham Heights
- Newton Highlands
- Newtonville
- Green Line
- Needham Commuter Rail
- Worcester Commuter Rail

**T** Massachusetts Bay Transportation Authority **massDOT**  
Massachusetts Department of Transportation

Information 617-222-3200 • 1-800-392-6100  
(TTY) 617-222-5146 • www.mbta.com

**Route 52**  
**Dedham Mall or Charles River Loop-**  
**Watertown Yard**

**Route 59**  
**Needham Junction-Watertown Square**

| 59 | Sunday                       |                               |                               |                               |                               |                               |
|----|------------------------------|-------------------------------|-------------------------------|-------------------------------|-------------------------------|-------------------------------|
|    | Inbound                      |                               |                               | Outbound                      |                               |                               |
|    | Leave<br>Needham<br>Junction | Arrive<br>Newton<br>Highlands | Arrive<br>Watertown<br>Square | Leave<br>Watertown<br>Square. | Arrive<br>Newton<br>Highlands | Arrive<br>Needham<br>Junction |
|    | 7:50A                        | 8:08A                         | 8:20A                         | 7:05A                         | 7:16A                         | 7:32A                         |
|    | 9:20                         | 9:38                          | 9:50                          | 8:35                          | 8:48                          | 9:07                          |
|    | 10:50                        | 11:08                         | 11:22                         | 10:05                         | 10:18                         | 10:37                         |
|    |                              |                               |                               | 11:35                         | 11:49                         | 12:08P                        |
|    | 12:20P                       | 12:39P                        | 12:54P                        |                               |                               |                               |
|    | 1:50                         | 2:06                          | 2:21                          | 1:05P                         | 1:19P                         | 1:38P                         |
|    | 3:20                         | 3:39                          | 3:56                          | 2:35                          | 2:49                          | 3:08                          |
|    | 4:50                         | 5:08                          | 5:24                          | 4:05                          | 4:19                          | 4:39                          |
|    | 6:20                         | 6:36                          | 6:51                          | 5:35                          | 5:49                          | 6:09                          |

The diagram illustrates the relationship between buses and trains. On the left, a single bus is shown. In the middle, two buses are shown with a plus sign between them. On the right, a single train is shown. In the middle, two trains are shown with a plus sign between them.

**VALID PASSES:** LinkPass (\$84.50/mo.); Local Bus (\$55/mo.); \*Student/Youth LinkPass (\$30.00/mo.); \*\*Senior/TAP LinkPass (\$30/mo.); and express bus, commuter rail, and boat passes.

**FREE FARES:** Children 11 and under ride free when accompanied by an adult; Blind Access CharlieCard holders ride free and if using a guide, the guide rides free.

- \* Requires Student CharlieCard or Youth CharlieCard. Student CharlieCards are available to students through participating middle schools and high schools. Youth CharlieCards are available through community partners in the Boston metro area. Visit [www.mbta.com/youthcharliecard](http://www.mbta.com/youthcharliecard) for details.
- \*\* Requires Senior/TAP CharlieCard, available to Medicare cardholders, seniors 65+, and persons with disabilities.

**Fall 2018 & Winter 2019 Holidays**  
 9/3/18: see Sunday 10/8/18: see Weekday  
 11/22/18, 12/25/18, 1/1/19: see Sunday 1/21/19 & 2/18/19: see Saturday

| T Fares                                                                              |           |           |               |                     |
|--------------------------------------------------------------------------------------|-----------|-----------|---------------|---------------------|
|                                                                                      |           |           |               |                     |
| PRICE PER TRIP                                                                       | Local Bus | Bus + Bus | Rapid Transit | Bus + Rapid Transit |
| CharlieCard                                                                          | \$1.70    | \$1.70    | \$2.25        | \$2.25              |
| CharlieTicket                                                                        | \$2.00    | \$2.00    | \$2.75        | \$4.75***           |
| Cash-on-Board                                                                        | \$2.00    | \$4.00    | \$2.75        | \$4.75***           |
| Student/Youth*                                                                       | \$0.85    | \$0.85    | \$1.10        | \$1.10              |
| Senior/TAP**                                                                         | \$0.85    | \$0.85    | \$1.10        | \$1.10              |
| UNLIMITED TRIP PASSES                                                                |           |           |               |                     |
| 1-Day                                                                                | \$12.00   | \$12.00   | \$12.00       | \$12.00             |
| 7-Day                                                                                | \$21.25   | \$21.25   | \$21.25       | \$21.25             |
| Monthly                                                                              | \$55.00   | \$55.00   | \$84.50       | \$84.50             |
| Senior/TAP Monthly \$30.00/month for unlimited travel on Local Bus and Rapid Transit |           |           |               |                     |

**VALID PASSES:** LinkPass (\$84.50/mo.); Student /Youth LinkPass\* (\$30/mo.) ; Senior/TAP LinkPass\* (\$30/mo.); and express bus, commuter rail, and boat passes.

**FREE FARES:** Children 11 and under ride free when accompanied by an adult; Blind Access CharlieCard holders ride free: if using a guide, the guide rides free

\* Requires Student CharlieCard or Youth CharlieCard. Student CharlieCards are available to students through participating middle schools and high schools. Youth CharlieCards are available through community partners in the Boston metro area. Visit [www.mbta.com/youthpass](http://www.mbta.com/youthpass) for details.

\*\* Requires Senior/TAP CharlieCard, available to Medicare cardholders, seniors 65+, and persons with disabilities.

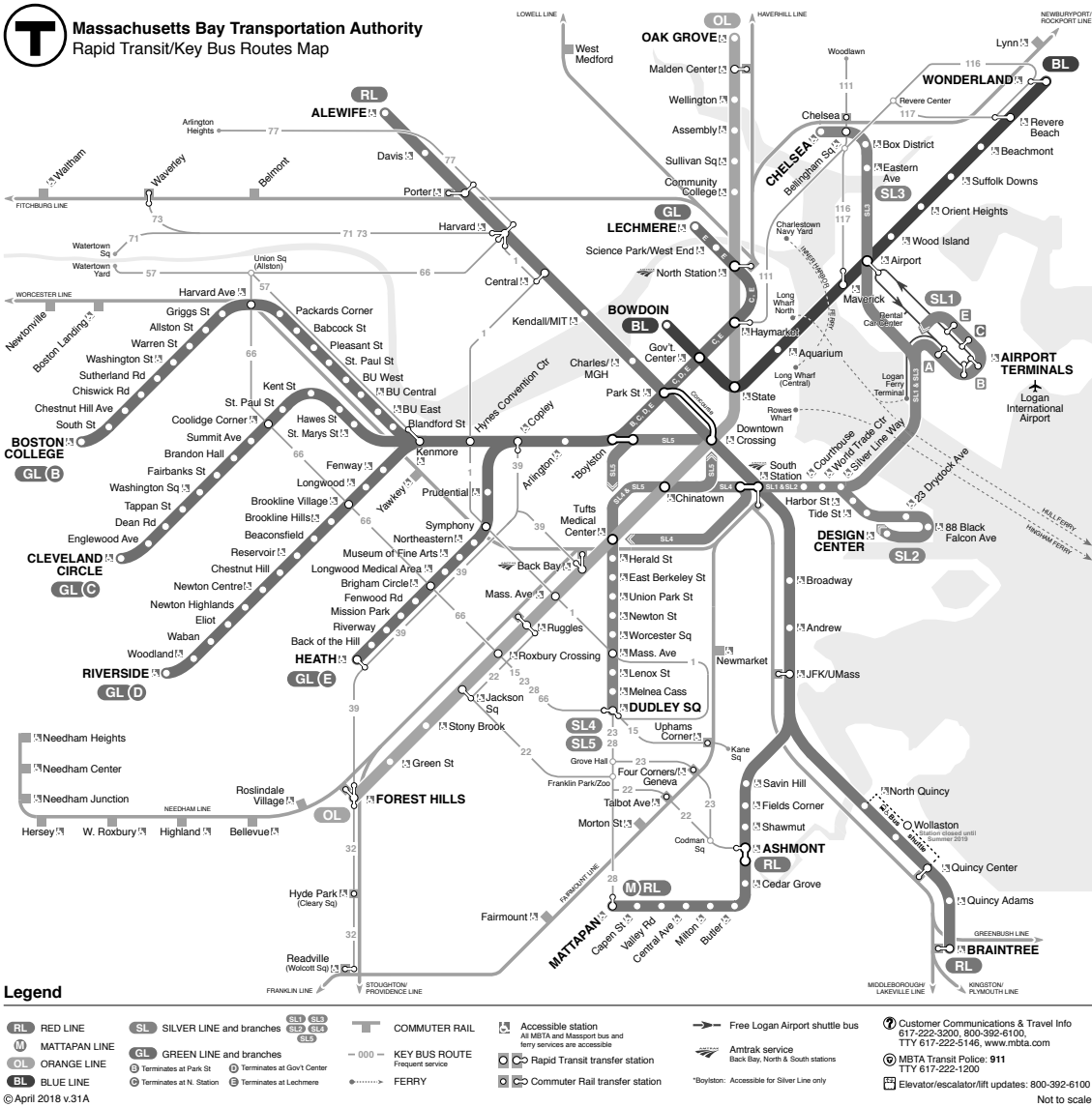
\*\*\* For Silver Line SL4 or SL5 pay \$2.75. Also see “transfers.”

TRANSFERS

If paying with a CharlieTicket or CharlieCard, discounted transfers that are available are automatic — just use the same ticket or card throughout your trip. If paying with cash onboard a vehicle, free transfers are only allowed between rapid transit lines and inside paid platform areas at gated stations.

SCHEDULES

Schedules are available at the following stations: Park Street, Airport, Malden, Harvard, Haymarket (Green Line Level), Back Bay, Downtown Crossing (Orange Line Level), and Quincy Center, or ask a Customer Service Agent. Schedules are also available at the State Transportation Building (10 Park Plaza), 45 High St, and online at [mbta.com](http://mbta.com).



# Rapid Transit

Effective September 2, 2018



Blue Line



Green Line



Orange Line



Red Line



Silver Line

**T** Massachusetts Bay Transportation Authority

**massDOT**  
Massachusetts Department of Transportation

Information 617-222-3200 • 1-800-392-6100  
(TTY) 617-222-5146 • [www.mbta.com](http://www.mbta.com)

| Rapid<br>Transit Line                                                            | Weekday                       |                         |                         |                         |                         |                         |                                 | Saturday                      |                         |                         |                         |                            |                                 | Sunday                        |                            |                         |                         |                            |                                 |
|----------------------------------------------------------------------------------|-------------------------------|-------------------------|-------------------------|-------------------------|-------------------------|-------------------------|---------------------------------|-------------------------------|-------------------------|-------------------------|-------------------------|----------------------------|---------------------------------|-------------------------------|----------------------------|-------------------------|-------------------------|----------------------------|---------------------------------|
|                                                                                  | First<br>Trip                 | AM<br>Peak              | Midday                  | PM<br>Peak              | Evening                 | Late<br>Night           | Last<br>Trip                    | First<br>Trip                 | AM<br>Peak              | PM<br>Peak              | Evening                 | Late<br>Night              | Last<br>Trip                    | First<br>Trip                 | AM<br>Peak                 | PM<br>Peak              | Evening                 | Late<br>Night              | Last<br>Trip                    |
| <b>Red Line</b><br><b>Alewife</b><br><b>Braintree*</b>                           | 5:24AM<br>5:13AM              | 9 min<br>9 min          | 14 min<br>14 min        | 9 min<br>9 min          | 12 min<br>12 min        | 12 min<br>12 min        | 12:15AM<br>12:17AM              | 5:24AM<br>5:15AM              | 14 min<br>14 min        | 14 min<br>14 min        | 14 min<br>14 min        | 14 min<br>14 min           | 12:15AM<br>12:17AM              | 6:08AM<br>6:00AM              | 15 min<br>15 min           | 15 min<br>15 min        | 15 min<br>15 min        | 16 min<br>16 min           | 12:15AM<br>12:17AM              |
| <b>Alewife</b><br><b>Ashmont</b>                                                 | 5:16AM<br>5:16AM              | 9 min<br>9 min          | 14 min<br>14 min        | 9 min<br>9 min          | 12 min<br>12 min        | 12 min w<br>12 min w    | 12:22AM<br>12:30AM              | 5:16AM<br>5:16AM              | 14 min<br>14 min        | 14 min<br>14 min        | 14 min<br>14 min        | 14 min w<br>14 min w       | 12:22AM<br>12:30AM              | 6:00AM<br>6:00AM              | 15 min<br>15 min           | 15 min<br>15 min        | 15 min<br>15 min        | 16 min<br>16 min           | w 12:22AM<br>w 12:30AM          |
| <b>“M” Ashmont</b><br><b>Mattapan</b>                                            | 5:17AM<br>5:05AM              | 5 min<br>5 min          | 8 min<br>8 min          | 5 min<br>5 min          | 12 min<br>12 min        | 12 min w<br>12 min      | 1:05AM<br>12:53AM               | 5:15AM<br>5:05AM              | 26 min<br>26 min        | 12 min<br>12 min        | 12 min<br>12 min        | 26 min w<br>26 min         | 1:05AM<br>12:53AM               | 6:03AM<br>5:51AM              | 26 min<br>26 min           | 12 min<br>12 min        | 12 min<br>12 min        | 26 min<br>26 min           | w 1:05AM<br>12:53AM             |
| <b>Blue Line</b><br><b>Wonderland</b><br><b>Orient Heights</b><br><b>Bowdoin</b> | 5:13AM<br>5:13AM<br>5:29AM    | 5 min<br>5 min<br>5 min | 9 min<br>9 min<br>9 min | 5 min<br>5 min<br>5 min | 9 min<br>9 min<br>9 min | 9 min<br>9 min<br>9 min | 12:28AM<br>12:33AM<br>w 1:00AM  | 5:25AM<br>5:13AM<br>5:29AM    | 9 min<br>9 min<br>9 min | 9 min<br>9 min<br>9 min | 9 min<br>9 min<br>9 min | 13 min<br>13 min<br>13 min | 12:28AM<br>12:33AM<br>w 1:00AM  | 5:58AM<br>6:03AM<br>6:21AM    | 13 min<br>13 min<br>13 min | 9 min<br>9 min<br>9 min | 9 min<br>9 min<br>9 min | 13 min<br>13 min<br>13 min | 12:28AM<br>12:33AM<br>w 1:00AM  |
| <b>Orange Line</b><br><b>Oak Grove</b><br><b>Forest Hills</b>                    | 5:16AM<br>5:16AM              | 6 min<br>6 min          | 9 min<br>9 min          | 6 min<br>6 min          | 10 min<br>10 min        | 10 min w<br>10 min w    | 12:30AM<br>12:28AM              | 5:16AM<br>5:16AM              | 10 min<br>10 min        | 9 min<br>9 min          | 11 min<br>11 min        | 11 min w<br>11 min w       | 12:30AM<br>12:28AM              | 6:00AM<br>6:00AM              | 13 min<br>13 min           | 11 min<br>11 min        | 11 min<br>11 min        | 11 min<br>11 min           | w 12:30AM<br>w 12:28AM          |
| <b>Green Line</b><br><b>B Boston College</b><br><b>Park Street</b>               | 5:01AM<br>5:42AM              | 6 min<br>6 min          | 8 min<br>8 min          | 6 min<br>6 min          | 8 min<br>8 min          | 9 min<br>9 min          | 12:10AM<br>w 12:52AM            | 4:45AM <sup>2</sup><br>5:40AM | 11 min<br>11 min        | 7 min<br>7 min          | 7 min<br>7 min          | 11 min<br>11 min           | 12:09AM<br>w 12:52AM            | 5:20AM <sup>2</sup><br>6:12AM | 12 min<br>12 min           | 9 min<br>9 min          | 7 min<br>7 min          | 10 min<br>10 min           | 12:10AM<br>w 12:52AM            |
| <b>C Cleveland Circle</b><br><b>North Station</b>                                | 5:01AM <sup>1</sup><br>5:55AM | 6 min<br>6 min          | 9 min<br>9 min          | 7 min<br>7 min          | 7 min<br>7 min          | 10 min<br>10 min        | 12:10AM<br>w 12:46AM            | 4:50AM <sup>2</sup><br>5:30AM | 10 min<br>10 min        | 9 min<br>9 min          | 8 min<br>8 min          | 10 min<br>10 min           | 12:10AM<br>w 12:46AM            | 5:30AM <sup>2</sup><br>6:06AM | 12 min<br>12 min           | 11 min<br>11 min        | 9 min<br>9 min          | 12 min<br>12 min           | 12:10AM<br>w 12:46AM            |
| <b>D Riverside</b><br><b>Government Ctr.</b>                                     | 4:56AM<br>5:41AM              | 6 min<br>6 min          | 8 min<br>8 min          | 6 min<br>6 min          | 8 min<br>8 min          | 11 min<br>11 min        | 12:05AM<br>w 12:49AM            | 4:55AM<br>5:38AM              | 13 min<br>13 min        | 9 min<br>9 min          | 8 min<br>8 min          | 10 min<br>10 min           | 12:02AM<br>w 12:49AM            | 5:25AM<br>6:10AM              | 13 min<br>13 min           | 11 min<br>11 min        | 11 min<br>11 min        | 11 min<br>11 min           | 12:05AM<br>w 12:49AM            |
| <b>E Lechmere</b><br><b>Heath Street</b>                                         | 5:01AM<br>5:38AM              | 6 min<br>6 min          | 8 min<br>8 min          | 6 min<br>6 min          | 9 min<br>9 min          | 9 min<br>9 min          | 12:30AM<br>12:47AM <sup>3</sup> | 5:01AM<br>5:39AM              | 11 min<br>11 min        | 9 min<br>9 min          | 11 min<br>11 min        | 11 min<br>11 min           | 12:30AM<br>12:47AM <sup>3</sup> | 5:35AM<br>6:15AM              | 12 min<br>12 min           | 12 min<br>12 min        | 12 min<br>12 min        | 12 min<br>12 min           | 12:30AM<br>12:47AM <sup>3</sup> |
| <b>Silver Line</b><br><b>SL1 Logan Airport</b><br><b>South Station</b>           | 5:38AM<br>5:40AM              | 8 min<br>8 min          | 9 min<br>9 min          | 10 min<br>10 min        | 9 min<br>9 min          | 12 min<br>12 min        | f 2:30AM<br>1:00AM              | 5:33AM<br>5:35AM              | 12 min<br>12 min        | 12 min<br>12 min        | 12 min<br>12 min        | 12 min<br>12 min           | f 2:30AM<br>1:00AM              | 5:50AM<br>6:12AM              | 12 min<br>12 min           | 8 min<br>8 min          | 8 min<br>8 min          | 8 min<br>8 min             | f 2:30AM<br>1:00AM              |
| <b>SL2 Design Center</b><br><b>South Station</b>                                 | 6:03AM<br>5:45AM              | 5 min<br>5 min          | 10 min<br>10 min        | 5 min<br>5 min          | 9 min<br>9 min          | 15 min<br>15 min        | 12:30AM<br>12:50AM              | 6:10AM<br>5:50AM              | 15 min<br>15 min        | 15 min<br>15 min        | 15 min<br>15 min        | 15 min<br>15 min           | 12:35AM<br>12:49AM              | 6:50AM<br>6:35AM              | 15 min<br>15 min           | 15 min<br>15 min        | 15 min<br>15 min        | 15 min<br>15 min           | 12:34AM<br>12:48AM              |
| <b>SL3 Chelsea Station</b><br><b>South Station</b>                               | 5:00AM<br>4:31AM              | 12 min<br>12 min        | 15 min<br>15 min        | 12 min<br>12 min        | 12 min<br>12 min        | 15 min<br>15 min        | f 1:22AM<br>w 12:55AM           | 5:30AM<br>4:53AM              | 12 min<br>12 min        | 12 min<br>12 min        | 15 min<br>15 min        | 15 min<br>15 min           | f 1:25AM<br>w 12:55AM           | 6:30AM<br>5:53AM              | 15 min<br>15 min           | 15 min<br>15 min        | 15 min<br>15 min        | 15 min<br>15 min           | f 1:25AM<br>w 12:55AM           |
| <b>SL4 Dudley Station</b><br><b>South Station</b>                                | 5:20AM<br>5:35AM              | 12 min<br>12 min        | 16 min<br>16 min        | 14 min<br>14 min        | 12 min<br>12 min        | 19 min<br>19 min        | 12:20AM<br>x 2:54AM             | 5:23AM<br>5:40AM              | 15 min<br>15 min        | 15 min<br>15 min        | 15 min<br>15 min        | 20 min<br>20 min           | 12:20AM<br>x 2:54AM             | 6:02AM<br>6:20AM              | 15 min<br>15 min           | 15 min<br>15 min        | 15 min<br>15 min        | 20 min<br>20 min           | 12:20AM<br>x 2:54AM             |
| <b>SL5 Dudley Station</b><br><b>Downtown Xing</b>                                | 5:15AM<br>5:32AM              | 8 min<br>8 min          | 10 min<br>10 min        | 8 min<br>8 min          | 7 min<br>7 min          | 17 min<br>17 min        | 12:53AM<br>w 1:07AM             | 5:19AM<br>5:34AM              | 10 min<br>10 min        | 10 min<br>10 min        | 11 min<br>11 min        | 11 min<br>11 min           | 12:46AM<br>w 1:00AM             | 6:00AM<br>6:15AM              | 10 min<br>10 min           | 8 min<br>8 min          | 9 min<br>9 min          | 9 min<br>9 min             | 12:25AM<br>w 12:47AM            |

**Schedule Periods (approximate):**

AM Rush Hour: 6:30 AM - 9:00 AM  
Midday: 9:00 AM - 3:30 PM  
PM Rush Hour: 3:30 PM - 6:30 PM  
Evening: 6:30 PM - 8:00 PM  
Late Night: 8:00 PM - CLOSE

**Red Line Note:**

\*Braintree Line:  
Due to construction on Wollaston Station the station will be closed. During construction shuttle buses will operate between Wollaston, North Quincy, and Quincy Center Stations. Please visit [mbta.com/alerts](http://mbta.com/alerts) for updated service information.

**Mattapan Note:**

Saturday and Sunday before 10:00 AM and after 8:00 PM trips depart every 26 minutes and the rest of the day every 12 minutes. Also, see Mattapan Line Schedule Card.

**Green Line Notes:**

1 - The first two C Line AM inbound trips run through to Lechmere Station on weekdays.

2 - The first B Line and second C Line AM inbound trips run through to Lechmere Station on weekends.

3 - The 12:32AM trip from Heath St is the last connecting train to other lines downtown. The 12:47AM trip from Heath St. runs in service to Lechmere with no guaranteed connections.

f - After exiting Ted Williams Tunnel bus will only service World Trade Center and South Station stops.

w - Last trips wait at some stations, primarily in the Downtown area, for connecting service. Departure times are approximate.

x - Trip departs from Summer St. @ Dorchester Ave. and omits Essex Street stop.

**Fall 2018 & Winter 2019 Holidays**  
9/3/18: see Sunday 10/8/18: see Weekday  
11/22/18, 12/25/18, 1/1/19: see Sunday  
1/21/19 & 2/18/19: see Saturday  
Silver Line see Weekday

# NEEDHAM LINE effective May 21, 2018



Massachusetts Bay  
Transportation Authority

KEOLIS

## Monday to Friday

### Inbound to Boston

| ZONE | STATION            | TRAIN # | 600    | 602    | 604    | 606    | 608    | 610     | 612     | 614    | 616    | 618    | 620    | 622    | 624    | 626    | 628    | 630     |
|------|--------------------|---------|--------|--------|--------|--------|--------|---------|---------|--------|--------|--------|--------|--------|--------|--------|--------|---------|
|      | Bikes Allowed      |         |        |        |        |        |        |         |         |        |        |        |        |        |        |        |        |         |
| 2    | Needham Heights    | ♂       | 6:05   | 6:40   | 7:32   | 8:02   | 8:45   | 10:05   | 11:05   | 12:50  | 2:50   | 3:55   | 5:04   | 5:44   | 6:25   | 7:50   | 8:37   | 10:02   |
| 2    | Needham Center     | ♂       | 6:09   | 6:44   | 7:36   | 8:06   | 8:49   | 10:09   | 11:09   | 12:54  | 2:54   | 3:59   | f 5:08 | 5:48   | 6:29   | 7:54   | 8:41   | 10:06   |
| 2    | Needham Junction   | ♂       | 6:14   | 6:49   | 7:41   | 8:11   | 8:54   | 10:13   | 11:13   | 12:58  | 2:58   | 4:03   | -      | 5:52   | 6:33   | 7:58   | 8:45   | 10:10   |
| 2    | Hersey             | ♂       | 6:17   | 6:52   | 7:44   | 8:15   | 8:57   | 10:16   | 11:16   | 1:01   | 3:01   | -      | -      | -      | 6:36   | 8:03   | 8:48   | 10:13   |
| 1    | West Roxbury       | ♂       | 6:23   | 6:58   | 7:50   | 8:21   | 9:03   | 10:21   | 11:21   | 1:06   | 3:06   | 4:09   | 5:18   | 5:59   | 6:41   | 8:08   | 8:53   | 10:23   |
| 1    | Highland           | ♂       | 6:26   | 7:01   | 7:53   | 8:24   | 9:06   | 10:23   | 11:23   | 1:08   | 3:08   | -      | 5:20   | -      | 6:43   | 8:10   | 8:55   | 10:25   |
| 1    | Bellevue           | ♂       | 6:30   | 7:05   | 7:57   | 8:26   | 9:10   | 10:25   | 11:25   | 1:10   | 3:10   | -      | 5:22   | -      | 6:45   | 8:12   | 8:57   | 10:27   |
| 1    | Roslindale Village | ♂       | 6:33   | 7:08   | 8:00   | 8:30   | 9:13   | 10:28   | 11:28   | 1:13   | 3:13   | -      | 5:25   | -      | 6:48   | 8:15   | 9:00   | 10:30   |
| 1A   | Forest Hills       | ♂       | 6:36   | 7:11   | 8:03   | 8:33   | 9:16   | 10:31   | 11:31   | 1:16   | 3:16   | -      | 5:28   | -      | 6:53   | 8:18   | 9:03   | 10:33   |
| 1A   | Ruggles            | ♂       | L 6:41 | L 7:16 | L 8:08 | L 8:38 | L 9:21 | L 10:36 | L 11:36 | L 1:21 | -      | -      | -      | -      | -      | L 8:23 | L 9:08 | L 10:38 |
| 1A   | Back Bay           | ♂       | L 6:45 | L 7:20 | L 8:12 | L 8:42 | L 9:25 | L 10:40 | L 11:40 | L 1:25 | L 3:24 | L 4:22 | L 5:40 | L 6:17 | L 7:03 | L 8:27 | L 9:12 | L 10:42 |
| 1A   | South Station      | ♂       | 6:50   | 7:25   | 8:18   | 8:47   | 9:30   | 10:45   | 11:45   | 1:30   | 3:29   | 4:27   | 5:45   | 6:22   | 7:08   | 8:32   | 9:17   | 10:47   |

Trains in purple box indicate peak period trains.

## Monday to Friday

### Outbound from Boston

| ZONE | STATION            | TRAIN # | 601  | 603    | 605  | 607   | 609   | 611  | 613  | 615  | 617  | 619  | 621  | 623  | 625  | 627  | 629   | 631   |
|------|--------------------|---------|------|--------|------|-------|-------|------|------|------|------|------|------|------|------|------|-------|-------|
|      | Bikes Allowed      |         | ♂    | ♂      | ♂    | ♂     | ♂     | ♂    | ♂    |      |      |      |      |      | ♂    | ♂    | ♂     | ♂     |
| 1A   | South Station      | ♂       | 7:05 | 7:52   | 9:05 | 9:53  | 11:50 | 1:52 | 3:00 | 4:05 | 4:47 | 5:26 | 5:58 | 6:36 | 7:30 | 8:50 | 9:50  | 11:20 |
| 1A   | Back Bay           | ♂       | 7:10 | 7:57   | 9:10 | 9:58  | 11:55 | 1:57 | 3:05 | 4:10 | 4:52 | 5:31 | 6:03 | 6:41 | 7:35 | 8:55 | 9:55  | 11:25 |
| 1A   | Ruggles            | ♂       | -    | -      | -    | 10:02 | 11:59 | 2:01 | 3:09 | 4:14 | 4:56 | 5:35 | 6:07 | 6:45 | 7:39 | 8:59 | 9:59  | 11:29 |
| 1A   | Forest Hills       | ♂       | 7:17 | -      | 9:18 | 10:08 | 12:05 | 2:07 | 3:15 | 4:20 | 5:02 | 5:41 | 6:13 | 6:51 | 7:45 | 9:05 | 10:05 | 11:35 |
| 1    | Roslindale Village | ♂       | 7:20 | -      | 9:21 | 10:11 | 12:08 | 2:10 | 3:18 | 4:25 | 5:07 | 5:47 | 6:18 | 6:56 | 7:48 | 9:08 | 10:08 | 11:38 |
| 1    | Bellevue           | ♂       | 7:23 | -      | 9:24 | 10:14 | 12:11 | 2:13 | 3:21 | 4:28 | 5:10 | 5:50 | 6:21 | 6:59 | 7:51 | 9:11 | 10:11 | 11:41 |
| 1    | Highland           | ♂       | 7:25 | -      | 9:26 | 10:16 | 12:13 | 2:15 | 3:23 | 4:30 | 5:12 | 5:52 | 6:23 | 7:01 | 7:53 | 9:13 | 10:13 | 11:43 |
| 1    | West Roxbury       | ♂       | 7:27 | 8:09   | 9:29 | 10:18 | 12:15 | 2:17 | 3:25 | 4:32 | 5:14 | 5:54 | 6:25 | 7:03 | 7:55 | 9:15 | 10:15 | 11:45 |
| 2    | Hersey             | ♂       | 7:32 | -      | 9:34 | 10:25 | 12:20 | 2:22 | 3:30 | 4:37 | 5:20 | 6:00 | 6:30 | 7:08 | 8:00 | 9:20 | 10:20 | 11:50 |
| 2    | Needham Junction   | ♂       | 7:44 | 8:25   | 9:36 | 10:28 | 12:23 | 2:25 | 3:34 | 4:41 | 5:24 | 6:04 | 6:37 | 7:12 | 8:03 | 9:23 | 10:23 | 11:53 |
| 2    | Needham Center     | ♂       | 7:47 | L 8:28 | 9:39 | 10:31 | 12:26 | 2:28 | 3:37 | 4:44 | 5:27 | 6:07 | 6:40 | 7:15 | 8:06 | 9:26 | 10:26 | 11:56 |
| 2    | Needham Heights    | ♂       | 7:51 | 8:32   | 9:43 | 10:35 | 12:30 | 2:33 | 3:42 | 4:49 | 5:32 | 6:12 | 6:45 | 7:20 | 8:10 | 9:30 | 10:30 | 12:00 |

Trains in purple box indicate peak period trains.

## Saturday (NO SERVICE ON SUNDAY)

### Inbound to Boston

| ZONE | STATION            | TRAIN # | 1602   | 1604    | 1606    | 1608   | 1610   | 1612   | 1614   | 1616    | 1618    |
|------|--------------------|---------|--------|---------|---------|--------|--------|--------|--------|---------|---------|
|      | Bikes Allowed      |         |        |         |         |        |        |        |        |         |         |
| 2    | Needham Heights    | ♂       | 8:00   | 10:00   | 12:00   | 2:00   | 4:00   | 6:00   | 8:00   | 10:00   | 11:35   |
| 2    | Needham Center     | ♂       | 8:05   | 10:05   | 12:05   | 2:05   | 4:05   | 6:05   | 8:05   | 10:05   | -       |
| 2    | Needham Junction   | ♂       | 8:08   | 10:08   | 12:08   | 2:08   | 4:08   | 6:08   | 8:08   | 10:08   | -       |
| 2    | Hersey             | ♂       | 8:11   | 10:11   | 12:11   | 2:11   | 4:11   | 6:11   | 8:11   | 10:11   | -       |
| 1    | West Roxbury       | ♂       | 8:16   | 10:16   | 12:16   | 2:16   | 4:16   | 6:16   | 8:16   | 10:16   | -       |
| 1    | Highland           | ♂       | 8:18   | 10:18   | 12:18   | 2:18   | 4:18   | 6:18   | 8:18   | 10:18   | -       |
| 1    | Bellevue           | ♂       | 8:20   | 10:20   | 12:20   | 2:20   | 4:20   | 6:20   | 8:20   | 10:20   | -       |
| 1    | Roslindale Village | ♂       | 8:22   | 10:22   | 12:22   | 2:22   | 4:22   | 6:22   | 8:22   | 10:22   | -       |
| 1A   | Forest Hills       | ♂       | 8:26   | 10:26   | 12:26   | 2:26   | 4:26   | 6:26   | 8:26   | 10:26   | -       |
| 1A   | Ruggles            | ♂       | L 8:30 | L 10:30 | L 12:30 | L 2:30 | L 4:30 | L 6:30 | L 8:30 | L 10:30 | -       |
| 1A   | Back Bay           | ♂       | L 8:34 | L 10:34 | L 12:34 | L 2:34 | L 4:34 | L 6:34 | L 8:34 | L 10:34 | L 11:55 |
| 1A   | South Station      | ♂       | 8:39   | 10:39   | 12:39   | 2:39   | 4:39   | 6:39   | 8:39   | 10:39   | 12:00   |

## Saturday (NO SERVICE ON SUNDAY)

### Outbound from Boston

| ZONE |                    | STATION       | TRAIN # | 1601 | 1603  | 1605 | 1607 | 1609 | 1611 | 1613 | 1615  | 1617 |
|------|--------------------|---------------|---------|------|-------|------|------|------|------|------|-------|------|
|      |                    | Bikes Allowed |         | 🚲    | 🚲     | 🚲    | 🚲    | 🚲    | 🚲    | 🚲    | 🚲     | 🚲    |
| 1A   | South Station      | ♂             | 7:10    | 9:10 | 11:10 | 1:10 | 3:10 | 5:10 | 7:10 | 9:10 | 10:45 |      |
| 1A   | Back Bay           | ♂             | 7:15    | 9:15 | 11:15 | 1:15 | 3:15 | 5:15 | 7:15 | 9:15 | 10:50 |      |
| 1A   | Ruggles            | ♂             | 7:18    | 9:18 | 11:18 | 1:18 | 3:18 | 5:18 | 7:18 | 9:18 | 10:54 |      |
| 1A   | Forest Hills       | ♂             | 7:24    | 9:24 | 11:24 | 1:24 | 3:24 | 5:24 | 7:24 | 9:24 | 11:00 |      |
| 1    | Roslindale Village | ♂             | 7:28    | 9:28 | 11:28 | 1:28 | 3:28 | 5:28 | 7:28 | 9:28 | 11:03 |      |
| 1    | Bellevue           | ♂             | 7:30    | 9:30 | 11:30 | 1:30 | 3:30 | 5:30 | 7:30 | 9:30 | 11:06 |      |
| 1    | Highland           | ♂             | 7:33    | 9:33 | 11:33 | 1:33 | 3:33 | 5:33 | 7:33 | 9:33 | 11:08 |      |
| 1    | West Roxbury       | ♂             | 7:35    | 9:35 | 11:35 | 1:35 | 3:35 | 5:35 | 7:35 | 9:35 | 11:10 |      |
| 2    | Hersey             | ♂             | 7:39    | 9:39 | 11:39 | 1:39 | 3:39 | 5:39 | 7:39 | 9:39 | 11:15 |      |
| 2    | Needham Junction   | ♂             | 7:42    | 9:42 | 11:42 | 1:42 | 3:42 | 5:42 | 7:42 | 9:42 | 11:18 |      |
| 2    | Needham Center     | ♂             | 7:46    | 9:46 | 11:46 | 1:46 | 3:46 | 5:46 | 7:46 | 9:46 | 11:21 |      |
| 2    | Needham Heights    | ♂             | 7:50    | 9:50 | 11:50 | 1:50 | 3:50 | 5:50 | 7:50 | 9:50 | 11:25 |      |

## Keep in Mind:

This schedule will be effective from May 21, 2018 and will replace the schedule of November 20, 2017.

Times listed are departure times. To ensure you make your train, please be on the platform ready to board prior to departure time.

Presidents' Day and 4th of July operate on a **Saturday service schedule**.

New Year's Day, Memorial Day, Labor Day, Thanksgiving Day, and Christmas Day operate on a **Sunday service schedule**.

For all other holiday schedules, please check MBTA.com or call 617-222-3200.

For additional service to Ruggles Station, refer to the Providence and Franklin Line schedules for particular trains.



**Times in purple with "f" indicate a flag stop:** Passengers must tell the conductor that they wish to leave. Passengers waiting to board must be visible on the platform for the train to stop.



**Times in blue with "L" indicate an early departure:** The train may leave ahead of schedule at these stops.



**Bikes:** Bicycles are allowed on trains with the bicycle symbol shown below the train number.



**High level platform and bridge plate available.** Visit [mbta.com/accessibility](http://mbta.com/accessibility) for more information.



Massachusetts Bay  
Transportation Authority



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Customer Service  
**617-222-3200**

The Needham Shuttle serves member companies located along and in the Needham Crossing Area. Originating from the MBTA Green Line Station in Newton Highlands, this shuttle service makes 7 departures to the companies in the morning and 6 departures from the companies in the evening. See detailed schedule inside.

Member Companies that are part of the Needham Shuttle System:

- **Atrius Health**  
152 Second Avenue
- **Bulfinch**  
75 Second Avenue, 250 First Avenue,  
320 Needham Street, 117 Kendrick Street
- **Charles River Place**  
63 Kendrick Street
- **Direct Federal Credit Union**  
50 Cabot Street
- **Homewood Suites**  
200 First Avenue
- **INTEX Solutions**  
110 "A" Street
- **PTC**  
140 Kendrick Street
- **SharkNinja/Normandy Real Estate**  
89 "A" Street
- **Sheraton at Needham**  
100 Cabot Street

If your company is not on this list, please call or email us to find out how it can be.

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#### **MBTA INFORMATION**

617-222-3200 or 800-392-6100  
[www.mbta.com](http://www.mbta.com)



#### **ABOUT 128 BUSINESS COUNCIL:**

In 1985, three organizations — GTE Laboratories, Polaroid, and The Nelson Companies — joined together and funded a study of the Route 128 West area between Route 2 and Route 20. The study concluded that gridlock conditions would affect the Route 128 West region if strategies to reduce congestion and increase transportation options were not put in place. 128 Business Council is a non-profit public/private partnership that was formed to help reduce traffic congestion on Route 128 West by providing alternative transportation services and information.

The Council also works with state and federal transportation agencies on behalf of member businesses. The Council is funded by member companies that are committed to the economic vitality of the Route 128 West area from Woburn to Needham. Today, 128 Business Council continues to provide important alternative transportation services and information for its member companies, in addition to serving as a source for sustainability education and services.

**To learn more about 128 Business Council please visit [128bc.org/about](http://128bc.org/about).**



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Alewife Shuttle is operated by 128 Business Council  
395 Totten Pond Road, #302, Waltham, MA 02451  
P: 781-890-0093, F: 781-890-4736 [128bc.org](http://128bc.org)



## **SCHEDULE**

#### **EFFECTIVE DATE**

6/4/2018, Monday–Friday Only

#### **SHUTTLE DOES NOT OPERATE**

New Years Day, Memorial Day, Independence Day, Labor Day, Thanksgiving Day, Day after Thanksgiving, Christmas Day

#### **SERVING**

MBTA Newton Highlands Green Line Station to Needham Crossing

#### **FARES:**

Employees/Tenants of Member Companies Ride at No Charge with Green ID

Non-Member \$4.00 per ride

10-Ride passes are available from your driver, as time allows, or through PayPal at [128bc.org](http://128bc.org)

10-Ride Non Member Pass \$40.00

*Note: drivers cannot make change*

Members **MUST** show Green ID upon each boarding.

#### **INFORMATION:**

781-890-0093

[www.128bc.org](http://www.128bc.org)



## Morning Departures (all times a.m.)

### NEWTON HIGHLANDS >> NEEDHAM CROSSING

| VEHICLE NUMBER                                                             | 141       | 141       | 141       | 537       | 141       | 537       | 141       |
|----------------------------------------------------------------------------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|
| <b>DEPART<br/>NEWTON HIGHLANDS</b><br>(Corner of Lincoln & 1175 Walnut St) | 6:25<br>▼ | 7:05<br>▼ | 7:45<br>▼ | 8:05<br>▼ | 8:30<br>▼ | 8:55<br>▼ | 9:20<br>▼ |
| <b>BULFINCH</b><br>(320 Needham St, Newton )                               | 6:29      | 7:10      | 7:51      | 8:14      | 8:39      | 9:04      | 9:27      |
| <b>ATRIUS HEALTH</b><br>(152 Second Ave)                                   | 6:31      | 7:12      | 7:53      | 8:16      | 8:41      | 9:06      | 9:29      |
| <b>SHERATON</b><br>(100 Cabot)                                             | 6:34      | 7:15      | 7:56      | 8:19      | 8:44      | 9:09      | 9:32      |
| <b>BULFINCH</b><br>(75 Second Ave)                                         | 6:35      | 7:16      | 7:57      | 8:20      | 8:45      | 9:10      | 9:33      |
| <b>DIRECT FEDERAL CREDIT UNION</b><br>(50 Cabot St)                        | 6:36      | 7:17      | 7:58      | 8:21      | 8:46      | 9:11      | 9:34      |
| <b>HOMEWOOD SUITES</b><br>(200 First Ave)                                  | 6:38      | 7:19      | 8:00      | 8:23      | 8:48      | 9:13      | 9:36      |
| <b>BULFINCH</b><br>(250 First Ave)                                         | 6:39      | 7:20      | 8:01      | 8:24      | 8:49      | 9:14      | 9:37      |
| <b>NORMANDY</b><br>(89 "A" St)                                             | 6:41      | 7:22      | 8:03      | 8:26      | 8:51      | 9:16      | 9:39      |
| <b>INTEX</b><br>(110 "A" St)                                               | 6:42      | 7:23      | 8:04      | 8:27      | 8:52      | 9:17      | 9:40      |
| <b>CHARLES RIVER PLACE</b><br>(63 Kendrick St)                             | 6:45      | 7:26      | 8:07      | 8:30      | 8:55      | 9:20      | 9:43      |
| <b>BULFINCH</b><br>(117 Kendrick St)                                       | 6:46      | 7:27      | 8:08      | 8:31      | 8:56      | 9:21      | 9:44      |
| <b>PTC</b><br>(140 Kendrick St)                                            | 6:48      | 7:29      | 8:10      | 8:33      | 8:58      | 9:23      | 9:46      |

Morning arrival times are approximate and depend upon several factors, including: traffic and weather conditions as well as how many riders are going to different stops on the route. The shuttle will only stop at locations in the morning if riders are travelling there. **Morning arrival times will most likely be earlier than those listed.**

To use the shuttle in reverse, in either the morning or the evening, please call the Council. If you have an access issue, an ADA-compliant vehicle can be made available for you.

The Needham Shuttle is a professional commuter service. Foul language and/or inappropriate behavior will not be tolerated and may result in permanent loss of shuttle privileges.

**ALL ARRIVAL TIMES ARE APPROXIMATE. PLEASE ARRIVE AT STOP AT LEAST 5 MINUTES BEFORE LISTED TIME.** Shuttle will not wait for late riders.

## Evening Departures (all times p.m.)

### NEEDHAM CROSSING >> NEWTON HIGHLANDS

| VEHICLE NUMBER                                                         | 141       | 141       | 537       | 141       | 537       | 141       |
|------------------------------------------------------------------------|-----------|-----------|-----------|-----------|-----------|-----------|
| <b>DEPART<br/>CHARLES RIVER PLACE</b><br>(63 Kendrick St)              | 3:40<br>▼ | 4:40<br>▼ | 5:10<br>▼ | 5:40<br>▼ | 6:10<br>▼ | 6:40<br>▼ |
| <b>BULFINCH</b><br>(117 Kendrick St)                                   | 3:43      | 4:43      | 5:13      | 5:43      | 6:13      | 6:43      |
| <b>PTC</b><br>(140 Kendrick St)                                        | 3:45      | 4:45      | 5:15      | 5:45      | 6:15      | 6:45      |
| <b>NORMANDY</b><br>(89 "A" St)                                         | 3:48      | 4:48      | 5:18      | 5:48      | 6:18      | 6:48      |
| <b>INTEX</b><br>(110 "A" St)                                           | 3:50      | 4:50      | 5:20      | 5:50      | 6:20      | 6:50      |
| <b>BULFINCH</b><br>(250 First Ave)                                     | 3:51      | 4:51      | 5:21      | 5:51      | *         | *         |
| <b>HOMEWOOD SUITES</b><br>(200 First Ave)                              | 3:52      | 4:52      | 5:22      | 5:52      | 6:21      | 6:51      |
| <b>DIRECT FEDERAL CREDIT UNION</b><br>(50 Cabot St)                    | 3:54      | 4:54      | 5:24      | 5:54      | 6:23      | 6:53      |
| <b>SHERATON</b><br>(100 Cabot)                                         | 3:56      | 4:56      | 5:26      | 5:56      | 6:25      | 6:55      |
| <b>BULFINCH</b><br>(75 Second Ave)                                     | 3:57      | 4:57      | 5:27      | 5:57      | *         | *         |
| <b>ATRIUS HEALTH</b><br>(152 Second Ave)                               | 3:59      | 4:59      | 5:29      | 5:59      | 6:27      | 6:57      |
| <b>BULFINCH</b><br>(320 Needham St, Newton )                           | 4:04      | 5:04      | *         | *         | *         | *         |
| <b>ARRIVE NEWTON HIGHLANDS</b><br>(Corner of Lincoln & 1175 Walnut St) | 4:14      | 5:16      | 5:46      | 6:16      | 6:41      | 7:10      |

\*On demand only. Please call the 128 Business Council at 781-890-0093, ext. 3 by 3PM for pick-up on these runs.

EFFECTIVE DATE  
6/4/2018







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## Vehicular Crash Data



| Crash Number                                  | Crash Date | Weekday   | Crash Time | City/Town | Crash Severity                      | Number of NonFatal Injuries | Number of Fatal Injuries | Manner of Collision  | Vehicle Action Prior to Crash                                                                                              | Vehicle Travel Directions | Most Harmful Events                                                                                                                                                                 | Vehicle Configuration                                                                                                                                                                      | Non Motorist Type | Road Surface | Ambient Light              | Weather Condition             | Roadway                                                                    | Police Agency |
|-----------------------------------------------|------------|-----------|------------|-----------|-------------------------------------|-----------------------------|--------------------------|----------------------|----------------------------------------------------------------------------------------------------------------------------|---------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------|--------------|----------------------------|-------------------------------|----------------------------------------------------------------------------|---------------|
| 1: Chestnut Street at Route 9 WB Service Road |            |           |            |           |                                     |                             |                          |                      |                                                                                                                            |                           |                                                                                                                                                                                     |                                                                                                                                                                                            |                   |              |                            |                               |                                                                            |               |
| 3671926                                       | 12/1/2013  | Sunday    | 8:09 AM    | NEWTON    | Property damage only (none injured) | 0                           | 0                        | Single vehicle crash | V1: Slowing or stopped in traffic                                                                                          | V1:W                      | V1:(Collision with motor vehicle in traffic)                                                                                                                                        | V1:(Passenger car)                                                                                                                                                                         |                   | Ice          | Daylight                   | Rain                          | BOYLSTON-CHESTNUT STREETS SERVICE ROAD / CHESTNUT                          | State police  |
| 3685206                                       | 12/1/2013  | Sunday    | 8:09 AM    | NEWTON    | Property damage only (none injured) | 0                           | 0                        | Single vehicle crash | V1: Slowing or stopped in traffic                                                                                          | V1:W                      | V1:(Collision with motor vehicle in traffic)                                                                                                                                        | V1:(Passenger car)                                                                                                                                                                         |                   | Ice          | Daylight                   | Rain                          | BOYLSTON-CHESTNUT STREETS SERVICE ROAD / CHESTNUT                          | State police  |
| 3718631                                       | 1/18/2014  | Saturday  | 1:20 PM    | NEWTON    | Not Reported                        | 0                           | 0                        | Single vehicle crash | V1: Travelling straight ahead                                                                                              | V1:W                      | V1:(Collision with other fixed object (wall, building, tunnel, etc.))                                                                                                               | V1:(Light truck(van, mini-van, panel, pickup, sport utility) with only four tires)                                                                                                         |                   | Ice          | Daylight                   | Sleet, hail (freezing rain or | CHESTNUT STREET / BOYLSTON-CHESTNUT STREETS SERVICE ROAD / CHESTNUT STREET | Local police  |
| 4088313                                       | 9/1/2015   | Tuesday   | 11:33 AM   | NEWTON    | Property damage only (none injured) | 0                           | 0                        | Angle                | V1: Travelling straight ahead / V2:Travelling straight ahead                                                               | V1:W / V2:N               | V1:(Collision with motor vehicle in traffic) V2:(Collision with motor vehicle in traffic)                                                                                           | V1:(Passenger car) V2:(Passenger car)                                                                                                                                                      |                   | Dry          | Daylight                   | Clear/Clear                   | BOYLSTON-CHESTNUT STREETS SERVICE ROAD / CHESTNUT STREET                   | Local police  |
| 4129828                                       | 12/1/2015  | Tuesday   | 5:15 PM    | NEWTON    | Property damage only (none injured) | 0                           | 0                        | Angle                | V1: Turning left / V2:Entering traffic lane                                                                                | V1:W / V2:S               | V1:(Collision with motor vehicle in traffic) V2:(Collision with motor vehicle in traffic)                                                                                           | V1:(Passenger car) V2:(Passenger car)                                                                                                                                                      |                   | Wet          | Dark - roadway not lighted | Rain/Cloudy                   | CHESTNUT STREET / BOYLSTON-CHESTNUT STREETS SERVICE ROAD                   | Local police  |
| 2: Chestnut Street at Route 9 EB Service Road |            |           |            |           |                                     |                             |                          |                      |                                                                                                                            |                           |                                                                                                                                                                                     |                                                                                                                                                                                            |                   |              |                            |                               |                                                                            |               |
| 3795742                                       | 4/16/2014  | Wednesday | 10:17 AM   | NEWTON    | Property damage only (none injured) | 0                           | 0                        | Rear-end             | V1: Slowing or stopped in traffic / V2:Travelling straight ahead                                                           | V1:E / V2:E               | V1:(Collision with motor vehicle in traffic) V2:(Collision with motor vehicle in traffic)                                                                                           | V1:(Passenger car) V2:(Light truck(van, mini-van, panel, pickup, sport utility) with only                                                                                                  |                   | Dry          | Daylight                   | Cloudy                        | BOYLSTON STREET Rte UNKNOWN E                                              | State police  |
| 3347065                                       | 1/7/2013   | Monday    | 11:48 AM   | NEWTON    | Non-fatal injury                    | 1                           | 0                        | Angle                | V1: Turning right                                                                                                          | V1:8                      | V1:(Collision with pedestrian)                                                                                                                                                      | V1:(Passenger car)                                                                                                                                                                         | P2:Pedestrian     | Dry          | Daylight                   | Clear/Clear                   | CHESTNUT ST                                                                | Local police  |
| 3566619                                       | 8/19/2013  | Monday    | 7:38 PM    | NEWTON    | Property damage only                | 0                           | 0                        | Single vehicle       | V1: Parked                                                                                                                 | V1:W                      | V1:(Other)                                                                                                                                                                          | V1:(Passenger car)                                                                                                                                                                         |                   | Dry          | Daylight                   | Clear                         | BOYLSTON STREET Rte UNKNOWN                                                | State police  |
| 3: Chestnut Street at Elliot Street           |            |           |            |           |                                     |                             |                          |                      |                                                                                                                            |                           |                                                                                                                                                                                     |                                                                                                                                                                                            |                   |              |                            |                               |                                                                            |               |
| 2832837                                       | 12/7/2011  | Wednesday | 6:56 AM    | NEWTON    | Property damage only (none injured) | 0                           | 0                        | Angle                | V1: Travelling straight ahead / V2:Travelling straight ahead                                                               | V1:N / V2:E               | V1:(Collision with motor vehicle in traffic) V2:(Collision with motor vehicle in traffic)                                                                                           | V1:(Light truck(van, mini-van, panel, pickup, sport utility) with only four tires) V2:(Passenger car)                                                                                      |                   | Wet          | Dawn                       | Cloudy/Rain                   | CHESTNUT ST / ELLIOT ST                                                    | Local police  |
| 3243676                                       | 8/15/2012  | Wednesday | 8:35 PM    | NEWTON    | Not Reported                        | 0                           | 0                        | Angle                | V1: Parked                                                                                                                 | V1:W                      | V1:(Collision with motor vehicle in traffic)                                                                                                                                        | V1:(Passenger car)                                                                                                                                                                         |                   | Dry          | Dark - lighted roadway     | Cloudy                        | ELLIOT ST                                                                  | Local police  |
| 3407598                                       | 4/27/2013  | Saturday  | 5:55 PM    | NEWTON    | Non-fatal injury                    | 1                           | 0                        | Angle                | V1: Travelling straight ahead / V2:Turning left                                                                            | V1:N / V2:S               | V1:(Collision with motor vehicle in traffic) V2:(Collision with motor vehicle in traffic)                                                                                           | V1:(Motorcycle) V2:(Passenger car)                                                                                                                                                         |                   | Dry          | Daylight                   | Clear                         | CHESTNUT ST / ELLIOT ST                                                    | Local police  |
| 3711542                                       | 12/19/2013 | Thursday  | 12:47 PM   | NEWTON    | Not Reported                        | 0                           | 0                        | Unknown              | V1: Parked / V2:Unknown                                                                                                    | V1:U / V2:U               | V1:(Collision with parked motor vehicle) V2:(Collision with parked motor vehicle)                                                                                                   | V1:(Passenger car) V2:(Light truck(van, mini-van, panel, pickup, sport utility) with only                                                                                                  |                   | Dry          | Daylight                   | Clear                         | CHESTNUT ST / ELLIOT ST                                                    | Local police  |
| 3718496                                       | 1/9/2014   | Thursday  | 8:27 PM    | NEWTON    | Non-fatal injury                    | 1                           | 0                        | Single vehicle       | V1: Travelling straight ahead                                                                                              | V1:W                      | V1:(Collision with fence)                                                                                                                                                           | V1:(Passenger car)                                                                                                                                                                         |                   | Dry          | Dark - lighted             | Clear                         | ELLIOT ST                                                                  | Local police  |
| 3919821                                       | 8/11/2014  | Monday    | 12:15 PM   | NEWTON    | Non-fatal injury                    | 1                           | 0                        | Angle                | V1: Travelling straight ahead / V2:Travelling straight ahead                                                               | V1:W / V2:N               | V1:(Collision with motor vehicle in traffic) V2:(Collision with motor vehicle in traffic)                                                                                           | V1:(Light truck(van, mini-van, panel, pickup, sport utility) with only four tires) V2:(Passenger car)                                                                                      |                   | Dry          | Daylight                   | Clear/Cloudy                  | CHESTNUT ST / ELLIOT ST                                                    | Local police  |
| 3939122                                       | 9/6/2014   | Saturday  | 11:28 AM   | NEWTON    | Non-fatal injury                    | 1                           | 0                        | Angle                | V1: Travelling straight ahead / V2:Travelling straight ahead                                                               | V1:S / V2:W               | V1:(Collision with motor vehicle in traffic) V2:(Collision with motor vehicle in traffic)                                                                                           | V1:(Passenger car) V2:(Passenger car)                                                                                                                                                      |                   | Dry          | Daylight                   | Clear                         | CHESTNUT STREET / ELLIOT STREET                                            | Local police  |
| 2682976                                       | 1/18/2011  | Tuesday   | 12:28 PM   | NEWTON    | Non-fatal injury                    | 1                           | 0                        | Rear-end             | V1: Slowing or stopped in traffic / V2:Slowing or stopped in traffic                                                       | V1:S / V2:S               | V1:(Collision with motor vehicle in traffic) V2:(Collision with motor vehicle in traffic)                                                                                           | V1:(Light truck(van, mini-van, panel, pickup, sport utility) with only four tires) V2:(Light truck(van, mini-van, panel, pickup, sport utility) with only                                  |                   | Snow         | Daylight                   | Snow/Snow                     | CHESTNUT ST / ELLIOT ST                                                    | Local police  |
| 2689694                                       | 1/27/2011  | Thursday  | 10:00 AM   | NEWTON    | Non-fatal injury                    | 1                           | 0                        | Angle                | V1: Travelling straight ahead / V2:Travelling straight ahead / V3:Travelling straight ahead                                | V1:S / V2:S / V3:N        | V1:(Collision with motor vehicle in traffic) V2:(Collision with motor vehicle in traffic) V3:(Collision with motor vehicle in traffic)                                              | V1:(Passenger car) V2:(Passenger car) V3:(Light truck(van, mini-van, panel, pickup, sport utility) with only four tires)                                                                   |                   | Snow         | Daylight                   | Snow                          | ELLIOT ST                                                                  | Local police  |
| 2704007                                       | 2/23/2011  | Wednesday | 4:10 PM    | NEWTON    | Non-fatal injury                    | 1                           | 0                        | Head-on              | V1: Travelling straight ahead / V2:Turning left                                                                            | V1:W / V2:E               | V1:(Collision with motor vehicle in traffic) V2:(Collision with motor vehicle in traffic)                                                                                           | V1:(Passenger car) V2:(Light truck(van, mini-van, panel, pickup, sport utility) with only                                                                                                  |                   | Dry          | Daylight                   | Clear                         | CHESTNUT ST / ELLIOT ST                                                    | Local police  |
| 2980180                                       | 3/16/2012  | Friday    | 2:24 PM    | NEWTON    | Property damage only (none injured) | 0                           | 0                        | Angle                | V1: Travelling straight ahead / V2:Travelling straight ahead                                                               | V1:E / V2:S               | V1:(Collision with motor vehicle in traffic) V2:(Collision with motor vehicle in traffic)                                                                                           | V1:(Passenger car) V2:(Light truck(van, mini-van, panel, pickup, sport utility) with only                                                                                                  |                   | Wet          | Daylight                   | Rain                          | CHESTNUT ST / ELLIOT ST                                                    | Local police  |
| 3509756                                       | 7/1/2013   | Monday    | 10:58 PM   | NEWTON    | Non-fatal injury                    | 1                           | 0                        | Not reported         | V1: Travelling straight ahead                                                                                              | V1:N                      | V1:(Collision with pedestrian)                                                                                                                                                      | V1:(Passenger car)                                                                                                                                                                         | P2:Skater         | Not reported | Not reported               | Not Reported                  | CHESTNUT ST / ELLIOT ST                                                    | Local police  |
| 3541303                                       | 7/24/2013  | Wednesday | 11:44 AM   | NEWTON    | Property damage only (none injured) | 0                           | 0                        | Angle                | V1: Travelling straight ahead / V2:Travelling straight ahead / V3:Travelling straight ahead / V4:Travelling straight ahead | V1:N / V2:W / V3:W / V4:E | V1:(Collision with motor vehicle in traffic) V2:(Collision with motor vehicle in traffic) V3:(Collision with motor vehicle in traffic) V4:(Collision with motor vehicle in traffic) | V1:(Passenger car) V2:(Light truck(van, mini-van, panel, pickup, sport utility) with only four tires) V3:(Passenger car) V4:(Light truck(van, mini-van, panel, pickup, sport utility) with |                   | Dry          | Daylight                   | Clear                         | CHESTNUT ST / ELLIOT ST                                                    | Local police  |

| Crash Number                        | Crash Date | Weekday   | Crash Time | City/Town | Crash Severity                      | Number of NonFatal Injuries | Number of Fatal Injuries | Manner of Collision       | Vehicle Action Prior to Crash                                                                           | Vehicle Travel Directions | Most Harmful Events                                                                                                                    | Vehicle Configuration                                                                                                                                                                                                     | Non Motorist Type | Road Surface | Ambient Light          | Weather Condition | Roadway                      | Police Agency |
|-------------------------------------|------------|-----------|------------|-----------|-------------------------------------|-----------------------------|--------------------------|---------------------------|---------------------------------------------------------------------------------------------------------|---------------------------|----------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------|--------------|------------------------|-------------------|------------------------------|---------------|
| 3: Chestnut Street at Elliot Street |            |           |            |           |                                     |                             |                          |                           |                                                                                                         |                           |                                                                                                                                        |                                                                                                                                                                                                                           |                   |              |                        |                   |                              |               |
| 2721428                             | 5/2/2011   | Monday    | 12:49 PM   | NEWTON    | Property damage only (none injured) | 0                           | 0                        | Angle                     | V1: Travelling straight ahead / V2:Travelling straight ahead                                            | V1:W / V2:N               | V1:(Collision with motor vehicle in traffic) V2:(Collision with motor vehicle in traffic)                                              | V1:(Passenger car) V2:(Passenger car)                                                                                                                                                                                     |                   | Dry          | Daylight               | Clear             | CHESTNUT ST / ELLIOT ST      | Local police  |
| 2725144                             | 5/12/2011  | Thursday  | 1:32 PM    | NEWTON    | Property damage only (none injured) | 0                           | 0                        | Angle                     | V1: Travelling straight ahead / V2:Travelling straight ahead                                            | V1:S / V2:N               | V1:(Collision with motor vehicle in traffic)                                                                                           | V1:(Light truck(van, mini-van, panel, pickup, sport utility) with only four tires) V2:(Light truck(van, mini-van, panel, pickup, sport utility) with only                                                                 |                   | Dry          | Daylight               | Clear             | CHESTNUT ST / ELLIOT ST      | Local police  |
| 2882517                             | 1/22/2012  | Sunday    | 2:11 PM    | NEWTON    | Non-fatal injury                    | 4                           | 0                        | Angle                     | V1: Travelling straight ahead / V2:Travelling straight ahead / V3:Slowing or stopped in traffic         | V1:S / V2:E / V3:N        | V1:(Collision with motor vehicle in traffic) V2:(Collision with motor vehicle in traffic) V3:(Collision with motor vehicle in traffic) | V1:(Passenger car) V2:(Passenger car) V3:(Passenger car)                                                                                                                                                                  |                   | Wet          | Daylight               | Clear/Clear       | CHESTNUT ST / ELLIOT ST      | Local police  |
| 3328845                             | 12/29/2012 | Saturday  | 11:42 PM   | NEWTON    | Property damage only (none injured) | 0                           | 0                        | Sideswipe, same           | V1: Parked                                                                                              | V1:U                      | V1:(Collision with motor vehicle in traffic)                                                                                           | V1:(Passenger car)                                                                                                                                                                                                        |                   | Snow         | Dark - lighted roadway | Snow              | ELLIOT ST                    | Local police  |
| 3599954                             | 9/12/2013  | Thursday  | 9:21 PM    | NEWTON    | Not Reported                        | 0                           | 0                        | Sideswipe, same direction | V1: Parked / V2:Turning right                                                                           | V1:W / V2:W               | V1:(Collision with motor vehicle in traffic) V2:(Collision with parked motor vehicle)                                                  | V1:(Passenger car) V2:(Passenger car)                                                                                                                                                                                     |                   | Dry          | Dark - lighted roadway | Clear/Clear       | ELLIOT ST                    | Local police  |
| 3356132                             | 2/5/2013   | Tuesday   | 1:42 PM    | NEWTON    | Non-fatal injury                    | 1                           | 0                        | Angle                     | V1: Travelling straight ahead / V2:Travelling straight ahead                                            | V1:E / V2:S               | V1:(Collision with motor vehicle in traffic) V2:(Collision with motor vehicle in traffic)                                              | V1:(Passenger car) V2:(Passenger car)                                                                                                                                                                                     |                   | Dry          | Daylight               | Cloudy            | CHESTNUT ST / ELLIOT ST      | Local police  |
| 3607786                             | 8/29/2013  | Thursday  | 6:26 PM    | NEWTON    | Property damage only (none injured) | 0                           | 0                        | Sideswipe, opposite       | V1: Parked                                                                                              | V1:U                      | V1:(Collision with parked motor vehicle)                                                                                               | V1:(Passenger car)                                                                                                                                                                                                        |                   | Dry          | Daylight               | Cloudy/Cloudy     | ELLIOT ST                    | Local police  |
| 3902204                             | 7/30/2014  | Wednesday | 12:10 PM   | NEWTON    | Property damage only (none injured) | 0                           | 0                        | Angle                     | V1: Travelling straight ahead / V2:Travelling straight ahead                                            | V1:W / V2:S               | V1:(Collision with motor vehicle in traffic) V2:(Collision with motor vehicle in traffic)                                              | V1:(Passenger car) V2:(Passenger car)                                                                                                                                                                                     |                   | Dry          | Daylight               | Cloudy            | CHESTNUT ST / ELLIOT ST      | Local police  |
| 4021798                             | 3/9/2015   | Monday    | 5:39 PM    | NEWTON    | Property damage only (none injured) | 0                           | 0                        | Rear-end                  | V1: Slowing or stopped in traffic / V2:Slowing or stopped in traffic / V3:Slowing or stopped in traffic | V1:S / V2:S / V3:S        | V1:(Collision with motor vehicle in traffic) V2:(Collision with motor vehicle in traffic) V3:(Collision with motor vehicle in traffic) | V1:(Light truck(van, mini-van, panel, pickup, sport utility) with only four tires) V2:(Light truck(van, mini-van, panel, pickup, sport utility) with only four tires) V3:(Light truck(van, mini-van, panel, pickup, sport |                   | Dry          | Daylight               | Clear             | CHESTNUT ST / ELLIOT ST      | Local police  |
| 4115531                             | 11/14/2015 | Saturday  | 10:40 AM   | NEWTON    | Property damage only (none injured) | 0                           | 0                        | Sideswipe, same direction | V1: Parked / V2:Travelling straight ahead                                                               | V1:E / V2:E               | V1:(Collision with motor vehicle in traffic) V2:(Collision with parked motor vehicle)                                                  | V1:(Light truck(van, mini-van, panel, pickup, sport utility) with only four tires) V2:(Passenger car)                                                                                                                     |                   | Dry          | Daylight               | Cloudy/Cloudy     | ELLIOT ST                    | Local police  |
| 4: Chestnut Street at Oak Street    |            |           |            |           |                                     |                             |                          |                           |                                                                                                         |                           |                                                                                                                                        |                                                                                                                                                                                                                           |                   |              |                        |                   |                              |               |
| 3027466                             | 3/28/2012  | Wednesday | 3:53 PM    | NEWTON    | Property damage only (none injured) | 0                           | 0                        | Sideswipe, same direction | V1: Entering traffic lane / V2:Travelling straight ahead                                                | V1:N / V2:N               | V1:(Collision with motor vehicle in traffic) V2:(Collision with motor vehicle in traffic)                                              | V1:(Passenger car) V2:()                                                                                                                                                                                                  |                   | Dry          | Daylight               | Cloudy            | CHESTNUT ST / OAK ST         | Local police  |
| 3033165                             | 3/12/2012  | Monday    | 6:20 AM    | NEWTON    | Property damage only (none injured) | 0                           | 0                        | Single vehicle crash      | V1: Travelling straight ahead                                                                           | V1:N                      | V1:(Collision with work zone maintenance equipment)                                                                                    | V1:(Truck/trailer)                                                                                                                                                                                                        |                   | Dry          | Dusk                   | Clear             | OAK STREET                   | Local police  |
| 4072417                             | 7/2/2015   | Thursday  | 9:42 AM    | NEWTON    | Not Reported                        | 0                           | 0                        | Sideswipe, same           | V1: Parked                                                                                              | V1:W                      | V1:(Collision with parked motor vehicle)                                                                                               | V1:(Passenger car)                                                                                                                                                                                                        |                   | Dry          | Daylight               | Clear             | CHESTNUT ST                  | Local police  |
| 2687132                             | 1/29/2011  | Saturday  | 10:25 PM   | NEWTON    | Not Reported                        | 0                           | 0                        | Angle                     | V1: Parked / V2:Not reported                                                                            | V1:W / V2:8               | V1:(Collision with motor vehicle in traffic) V2:()                                                                                     | V1:(Passenger car) V2:()                                                                                                                                                                                                  |                   | Wet          | Dark - lighted roadway | Clear             | CHESTNUT ST                  | Local police  |
| 2882510                             | 1/20/2012  | Friday    | 8:25 AM    | NEWTON    | Not Reported                        | 0                           | 0                        | Sideswipe, same direction | V1: Turning right / V2:Travelling straight ahead                                                        | V1:E / V2:E               | V1:(Collision with motor vehicle in traffic) V2:(Collision with motor vehicle in traffic)                                              | V1:(Passenger car) V2:(Passenger car)                                                                                                                                                                                     |                   | Wet          | Daylight               | Clear/Clear       | CHESTNUT ST                  | Local police  |
| 2915886                             | 2/8/2012   | Wednesday | 3:21 PM    | NEWTON    | Not Reported                        | 0                           | 0                        | Not reported              | V1: Parked                                                                                              | V1:8                      | V1:()                                                                                                                                  | V1:(Passenger car)                                                                                                                                                                                                        |                   | Not reported | Not reported           | Not Reported      | CHESTNUT ST                  | Local police  |
| 3738786                             | 2/14/2014  | Friday    | 9:51 AM    | NEWTON    | Not Reported                        | 0                           | 0                        | Unknown                   | V1: Parked                                                                                              | V1:U                      | V1:(Other non-collision)                                                                                                               | V1:(Passenger car)                                                                                                                                                                                                        |                   | Snow         | Unknown                | Snow              | CHESTNUT ST                  | Local police  |
| 3965327                             | 10/22/2014 | Wednesday | 8:20 AM    | NEWTON    | Non-fatal injury                    | 1                           | 0                        | Single vehicle crash      | V1: Turning left                                                                                        | V1:W                      | V1:(Collision with light pole or other post/support)                                                                                   | V1:(Passenger car)                                                                                                                                                                                                        |                   | Wet          | Daylight               | Rain              | CHESTNUT ST / OAK ST         | Local police  |
| 3976819                             | 11/11/2014 | Tuesday   | 6:08 PM    | NEWTON    | Property damage only (none injured) | 0                           | 0                        | Sideswipe, opposite       | V1: Parked / V2:Turning right                                                                           | V1:6 / V2:W               | V1:(Immersion) V2:(Collision with parked motor vehicle)                                                                                | V1:(Passenger car) V2:(Passenger car)                                                                                                                                                                                     |                   | Dry          | Dark - lighted roadway | Clear             | CHESTNUT ST                  | Local police  |
| 4100183                             | 9/28/2015  | Monday    | 4:55 PM    | NEWTON    | Not Reported                        | 0                           | 0                        | Unknown                   | V1: Parked                                                                                              | V1:6                      | V1:(Collision with unknown movable object)                                                                                             | V1:(Passenger car)                                                                                                                                                                                                        |                   | Dry          | Daylight               | Cloudy            | CHESTNUT ST                  | Local police  |
| 2752061                             | 7/20/2011  | Wednesday | 10:04 AM   | NEWTON    | Property damage only (none injured) | 0                           | 0                        | Single vehicle crash      | V1: Turning left / V2:Turning left                                                                      | V1:8 / V2:N               | V1:(Collision with utility pole) V2:(Collision with utility pole)                                                                      | V1:(Tractor/semi-trailer) V2:(Tractor/semi-trailer)                                                                                                                                                                       |                   | Dry          | Daylight               | Clear             | CHESTNUT STREET / OAK STREET | Local police  |
| 3363674                             | 2/22/2013  | Friday    | 2:49 PM    | NEWTON    | Property damage only (none injured) | 0                           | 0                        | Single vehicle crash      | V1: Other                                                                                               | V1:U                      | V1:(Collision with other fixed object (wall, building, tunnel, etc.))                                                                  | V1:(Passenger car)                                                                                                                                                                                                        |                   | Dry          | Daylight               | Clear             | CHESTNUT ST                  | Local police  |

| Crash Number                                       | Crash Date | Weekday   | Crash Time | City/Town | Crash Severity                      | Number of NonFatal Injuries | Number of Fatal Injuries | Manner of Collision           | Vehicle Action Prior to Crash                                                                       | Vehicle Travel Directions | Most Harmful Events                                                                                                                          | Vehicle Configuration                                                                                                                                     | Non Motorist Type | Road Surface | Ambient Light          | Weather Condition | Roadway                   | Police Agency |
|----------------------------------------------------|------------|-----------|------------|-----------|-------------------------------------|-----------------------------|--------------------------|-------------------------------|-----------------------------------------------------------------------------------------------------|---------------------------|----------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------|--------------|------------------------|-------------------|---------------------------|---------------|
| 4: Chestnut Street at Oak Street                   |            |           |            |           |                                     |                             |                          |                               |                                                                                                     |                           |                                                                                                                                              |                                                                                                                                                           |                   |              |                        |                   |                           |               |
| 3833872                                            | 6/6/2014   | Friday    | 10:33 AM   | NEWTON    | Not Reported                        | 0                           | 0                        | Unknown                       | V1: Parked / V2:Unknown                                                                             | V1:N / V2:U               | V1:(Collision with motor vehicle in traffic)<br>V2:(Collision with parked motor vehicle)                                                     | V1:(Passenger car) V2:(Passenger car)                                                                                                                     |                   | Unknown      | Daylight               | Unknown           | CHESTNUT ST               | Local police  |
| 4018965                                            | 2/3/2015   | Tuesday   | 5:56 PM    | NEWTON    | Property damage only (none injured) | 0                           | 0                        | Rear-to-rear                  | V1: Parked / V2:Backing                                                                             | V1:E / V2:E               | V1:(Collision with motor vehicle in traffic)<br>V2:(Collision with parked motor vehicle)                                                     | V1:(Passenger car) V2:(Light truck(van, mini-van, panel, pickup, sport utility) with only                                                                 |                   | Slush        | Dark - lighted roadway | Clear             | CHESTNUT ST               | Local police  |
| 4118197                                            | 11/13/2015 | Friday    | 5:50 PM    | NEWTON    | Not Reported                        | 0                           | 0                        | Unknown                       | V1: Parked                                                                                          | V1:8                      | V1:(Collision with motor vehicle in traffic)                                                                                                 | V1:(Passenger car)                                                                                                                                        |                   | Dry          | Dawn                   | Clear             | CHESTNUT ST               | Local police  |
| 5: Oak Street at Site Driveway                     |            |           |            |           |                                     |                             |                          |                               |                                                                                                     |                           |                                                                                                                                              |                                                                                                                                                           |                   |              |                        |                   |                           |               |
| 4011779                                            | 2/17/2015  | Tuesday   | 3:02 PM    | NEWTON    | Property damage only (none injured) | 0                           | 0                        | Unknown                       | V1: Parked / V2:Not reported                                                                        | V1:8 / V2:8               | V1:(Collision with motor vehicle in traffic)<br>V2:()                                                                                        | V1:(Passenger car) V2:()                                                                                                                                  |                   | Wet          | Daylight               | Cloudy/Snow       | OAK ST                    | Local police  |
| 6: Needham Street at Oak Street / Christina Street |            |           |            |           |                                     |                             |                          |                               |                                                                                                     |                           |                                                                                                                                              |                                                                                                                                                           |                   |              |                        |                   |                           |               |
| 2801257                                            | 11/9/2011  | Wednesday | 3:22 PM    | NEWTON    | Non-fatal injury                    | 1                           | 0                        | Angle                         | V1: Turning right / V2:Turning left                                                                 | V1:W / V2:W               | V1:(Collision with motor vehicle in traffic)<br>V2:(Collision with motor vehicle in traffic)                                                 | V1:(Passenger car) V2:(Passenger car)                                                                                                                     |                   | Dry          | Daylight               | Clear             | NEEDHAM ST / OAK ST       | Local police  |
| 2808709                                            | 11/4/2011  | Friday    | 4:25 PM    | NEWTON    | Property damage only (none injured) | 0                           | 0                        | Angle                         | V1: Changing lanes / V2:Slowing or stopped in traffic / V3:Overtaking/passing                       | V1:8 / V2:E / V3:E        | V1:(Collision with motor vehicle in traffic)<br>V2:(Collision with motor vehicle in traffic)<br>V3:(Collision with motor vehicle in traffic) | V1:(Light truck(van, mini-van, panel, pickup, sport utility) with only four tires) V2:(Passenger car) V3:(Passenger car)                                  |                   | Dry          | Daylight               | Clear             | NEEDHAM ST                | Local police  |
| 3250544                                            | 9/4/2012   | Tuesday   | 12:28 PM   | NEWTON    | Property damage only (none injured) | 0                           | 0                        | Rear-end                      | V1: Slowing or stopped in traffic / V2:Travelling straight ahead                                    | V1:S / V2:S               | V1:(Collision with motor vehicle in traffic)<br>V2:(Collision with motor vehicle in traffic)                                                 | V1:(Passenger car) V2:(Passenger car)                                                                                                                     |                   | Wet          | Daylight               | Rain              | OAK ST                    | Local police  |
| 3389660                                            | 4/8/2013   | Monday    | 7:53 PM    | NEWTON    | Non-fatal injury                    | 1                           | 0                        | Single vehicle crash          | V1: Turning right                                                                                   | V1:E                      | V1:(Collision with pedestrian)                                                                                                               | V1:(Light truck(van, mini-van, panel, pickup, sport utility) with only four tires)                                                                        | P2:Pedestrian     | Dry          | Daylight               | Clear             | NEEDHAM ST                | Local police  |
| 3397912                                            | 4/23/2013  | Tuesday   | 3:21 PM    | NEWTON    | Property damage only (none injured) | 0                           | 0                        | Sideswipe, same direction     | V1: Backing / V2:Parked / V3:Parked                                                                 | V1:6 / V2:6 / V3:6        | V1:(Collision with parked motor vehicle)<br>V2:(Collision with motor vehicle in traffic)<br>V3:(Collision with motor vehicle in traffic)     | V1:(Passenger car) V2:(Passenger car) V3:(Passenger car)                                                                                                  |                   | Wet          | Daylight               | Rain              | OAK ST                    | Local police  |
| 3397913                                            | 4/23/2013  | Tuesday   | 4:36 PM    | NEWTON    | Not Reported                        | 0                           | 0                        | Head-on                       | V1: Parked                                                                                          | V1:6                      | V1:(Collision with motor vehicle in traffic)                                                                                                 | V1:(Light truck(van, mini-van, panel, pickup, sport utility) with only four tires)                                                                        |                   | Wet          | Daylight               | Rain              | OAK ST                    | Local police  |
| 3397914                                            | 4/24/2013  | Wednesday | 10:32 AM   | NEWTON    | Non-fatal injury                    | 1                           | 0                        | Rear-end                      | V1: Turning right / V2:Slowing or stopped in traffic                                                | V1:S / V2:S               | V1:(Collision with motor vehicle in traffic)<br>V2:(Collision with motor vehicle in traffic)                                                 | V1:(Passenger car) V2:(Passenger car)                                                                                                                     |                   | Dry          | Daylight               | Clear             | NEEDHAM ST / OAK ST       | Local police  |
| 3718625                                            | 1/15/2014  | Wednesday | 12:19 PM   | NEWTON    | Property damage only (none injured) | 0                           | 0                        | Rear-end                      | V1: Travelling straight ahead / V2:Slowing or stopped in traffic / V3:Slowing or stopped in traffic | V1:E / V2:E / V3:E        | V1:(Collision with motor vehicle in traffic)<br>V2:(Collision with motor vehicle in traffic)<br>V3:(Collision with motor vehicle in traffic) | V1:(Passenger car) V2:(Passenger car) V3:(Passenger car)                                                                                                  |                   | Wet          | Daylight               | Clear             | OAK ST                    | Local police  |
| 3928259                                            | 8/26/2014  | Tuesday   | 7:05 AM    | NEWTON    | Property damage only (none injured) | 0                           | 0                        | Angle                         | V1: Travelling straight ahead / V2:Turning left                                                     | V1:N / V2:S               | V1:(Collision with motor vehicle in traffic)<br>V2:(Collision with motor vehicle in traffic)                                                 | V1:(Passenger car) V2:(Passenger car)                                                                                                                     |                   | Dry          | Daylight               | Clear             | NEEDHAM ST / OAK ST       | Local police  |
| 3955631                                            | 10/1/2014  | Wednesday | 11:31 AM   | NEWTON    | Property damage only (none injured) | 0                           | 0                        | Rear-end                      | V1: Slowing or stopped in traffic / V2:Travelling straight ahead                                    | V1:E / V2:E               | V1:(Collision with motor vehicle in traffic)<br>V2:(Collision with motor vehicle in traffic)                                                 | V1:(Light truck(van, mini-van, panel, pickup, sport utility) with only four tires) V2:(Light truck(van, mini-van, panel, pickup, sport utility) with only |                   | Wet          | Daylight               | Rain              | CHRISTINA ST / NEEDHAM ST | Local police  |
| 4045276                                            | 5/15/2015  | Friday    | 2:30 PM    | NEWTON    | Non-fatal injury                    | 1                           | 0                        | Single vehicle                | V1: Travelling straight ahead                                                                       | V1:N                      | V1:(Collision with fence)                                                                                                                    | V1:(Passenger car)                                                                                                                                        |                   | Dry          | Daylight               | Clear             | NEEDHAM ST / OAK ST       | Local police  |
| 2687012                                            | 1/31/2011  | Monday    | 8:19 AM    | NEWTON    | Property damage only (none injured) | 0                           | 0                        | Rear-end                      | V1: Slowing or stopped in traffic / V2:Slowing or stopped in traffic / V3:Travelling straight ahead | V1:W / V2:W / V3:W        | V1:(Collision with motor vehicle in traffic)<br>V2:(Collision with motor vehicle in traffic)<br>V3:(Collision with motor vehicle in traffic) | V1:(Passenger car) V2:(Passenger car) V3:(Light truck(van, mini-van, panel, pickup, sport utility) with only four tires)                                  |                   | Dry          | Daylight               | Clear/Clear       | NEEDHAM ST                | Local police  |
| 2898019                                            | 1/19/2012  | Thursday  | 7:37 PM    | NEWTON    | Property damage only (none injured) | 0                           | 0                        | Sideswipe, opposite direction | V1: Travelling straight ahead / V2:Travelling straight ahead                                        | V1:E / V2:W               | V1:(Collision with motor vehicle in traffic)<br>V2:(Collision with motor vehicle in traffic)                                                 | V1:(Passenger car) V2:(Light truck(van, mini-van, panel, pickup, sport utility) with only                                                                 |                   | Dry          | Dark - lighted roadway | Clear             | CHRISTINA ST / NEEDHAM ST | Local police  |
| 3451118                                            | 5/25/2013  | Saturday  | 1:11 AM    | NEWTON    | Non-fatal injury                    | 1                           | 0                        | Single vehicle                | V1: Turning left                                                                                    | V1:W                      | V1:(Collision with utility pole)                                                                                                             | V1:(Passenger car)                                                                                                                                        |                   | Wet          | Dark - lighted         | Cloudy/Rain       | NEEDHAM ST / OAK ST       | Local police  |
| 3531782                                            | 7/11/2013  | Thursday  | 11:21 AM   | NEWTON    | Property damage only (none injured) | 0                           | 0                        | Angle                         | V1: Turning right / V2:Turning left                                                                 | V1:W / V2:W               | V1:(Collision with motor vehicle in traffic)<br>V2:(Collision with motor vehicle in traffic)                                                 | V1:(Passenger car) V2:(Passenger car)                                                                                                                     |                   | Wet          | Daylight               | Cloudy            | NEEDHAM ST / OAK ST       | Local police  |
| 3976822                                            | 11/15/2014 | Saturday  | 11:31 PM   | NEWTON    | Property damage only (none injured) | 0                           | 0                        | Rear-end                      | V1: Slowing or stopped in traffic / V2:Travelling straight ahead                                    | V1:E / V2:E               | V1:(Collision with motor vehicle in traffic)<br>V2:(Collision with motor vehicle in traffic)                                                 | V1:(Passenger car) V2:(Light truck(van, mini-van, panel, pickup, sport utility) with only                                                                 |                   | Dry          | Dark - lighted roadway | Clear             | NEEDHAM ST / OAK ST       | Local police  |



| Crash Number                                       | Crash Date | Weekday   | Crash Time | City/Town | Crash Severity                      | Number of NonFatal Injuries | Number of Fatal Injuries | Manner of Collision           | Vehicle Action Prior to Crash                                                       | Vehicle Travel Directions | Most Harmful Events                                                                                                                    | Vehicle Configuration                                                                                 | Non Motorist Type                                   | Road Surface | Ambient Light          | Weather Condition | Roadway                     | Police Agency |
|----------------------------------------------------|------------|-----------|------------|-----------|-------------------------------------|-----------------------------|--------------------------|-------------------------------|-------------------------------------------------------------------------------------|---------------------------|----------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------|-----------------------------------------------------|--------------|------------------------|-------------------|-----------------------------|---------------|
| 6: Needham Street at Oak Street / Christina Street |            |           |            |           |                                     |                             |                          |                               |                                                                                     |                           |                                                                                                                                        |                                                                                                       |                                                     |              |                        |                   |                             |               |
| 3981614                                            | 11/30/2014 | Sunday    | 1:36 PM    | NEWTON    | Non-fatal injury                    | 1                           | 0                        | Rear-end                      | V1: Travelling straight ahead / V2:Slowing or stopped in traffic                    | V1:W / V2:W               | V1:(Collision with motor vehicle in traffic) V2:(Collision with motor vehicle in traffic)                                              | V1:(Passenger car) V2:(Passenger car)                                                                 |                                                     | Dry          | Daylight               | Clear/Clear       | NEEDHAM ST / OAK ST         | Local police  |
| 4070097                                            | 7/21/2015  | Tuesday   | 1:15 PM    | NEWTON    | Property damage only (none injured) | 0                           | 0                        | Rear-end                      | V1: Slowing or stopped in traffic / V2:Slowing or stopped in traffic                | V1:W / V2:W               | V1:(Collision with motor vehicle in traffic) V2:(Collision with motor vehicle in traffic)                                              | V1:(Light truck(van, mini-van, panel, pickup, sport utility) with only four tires) V2:(Passenger car) |                                                     | Dry          | Daylight               | Clear             | NEEDHAM ST / OAK ST         | Local police  |
| 2733579                                            | 6/14/2011  | Tuesday   | 3:45 PM    | NEWTON    | Property damage only (none injured) | 0                           | 0                        | Sideswipe, opposite direction | V1: Travelling straight ahead                                                       | V1:N                      | V1:(Collision with motor vehicle in traffic)                                                                                           | V1:(Light truck(van, mini-van, panel, pickup, sport utility) with only four tires)                    |                                                     | Dry          | Daylight               | Clear             | OAK ST                      | Local police  |
| 2737957                                            | 6/30/2011  | Thursday  | 6:20 PM    | NEWTON    | Non-fatal injury                    | 1                           | 0                        | Single vehicle crash          | V1: Slowing or stopped in traffic                                                   | V1:E                      | V1:(Collision with cyclist (bicycle, tricycle, unicycle, pedal car))                                                                   | V1:(Passenger car)                                                                                    | P3:Pedalcyclist (bicycle, tricycle, unicycle, pedal | Dry          | Daylight               | Clear             | NEEDHAM ST / OAK ST         | Local police  |
| 2743815                                            | 7/11/2011  | Monday    | 5:33 PM    | NEWTON    | Non-fatal injury                    | 1                           | 0                        | Angle                         | V1: Travelling straight ahead / V2:Turning left                                     | V1:W / V2:S               | V1:(Collision with motor vehicle in traffic) V2:(Collision with motor vehicle in traffic)                                              | V1:(Passenger car) V2:(Light truck(van, mini-van, panel, pickup, sport utility) with only             |                                                     | Dry          | Daylight               | Not Reported      | NEEDHAM ST                  | Local police  |
| 3041315                                            | 4/10/2012  | Tuesday   | 8:07 AM    | NEWTON    | Property damage only (none injured) | 0                           | 0                        | Sideswipe, same direction     | V1: Travelling straight ahead / V2:Turning left                                     | V1:N / V2:N               | V1:(Collision with motor vehicle in traffic) V2:(Collision with motor vehicle in traffic)                                              | V1:(Passenger car) V2:(Passenger car)                                                                 |                                                     | Dry          | Daylight               | Clear             | NEEDHAM ST / OAK ST         | Local police  |
| 3556754                                            | 7/11/2013  | Thursday  | 3:02 PM    | NEWTON    | Property damage only (none injured) | 0                           | 0                        | Sideswipe, same direction     | V1: Turning right                                                                   | V1:N                      | V1:(Collision with cyclist (bicycle, tricycle, unicycle, pedal car))                                                                   | V1:(Light truck(van, mini-van, panel, pickup, sport utility) with only four tires)                    | P2:Pedalcyclist (bicycle, tricycle, unicycle, pedal | Dry          | Daylight               | Clear             | NEEDHAM ST / OAK ST         | Local police  |
| 3803134                                            | 4/3/2014   | Thursday  | 1:24 PM    | NEWTON    | Property damage only (none injured) | 0                           | 0                        | Sideswipe, same direction     | V1: Slowing or stopped in traffic / V2:Slowing or stopped in traffic                | V1:E / V2:E               | V1:(Collision with motor vehicle in traffic) V2:(Collision with motor vehicle in traffic)                                              | V1:(Passenger car) V2:(Single-unit truck (2-axle, 6-tire))                                            |                                                     | Dry          | Daylight               | Clear             | NEEDHAM STREET / OAK STREET | Local police  |
| 4088323                                            | 9/12/2015  | Saturday  | 8:57 PM    | NEWTON    | Property damage only (none injured) | 0                           | 0                        | Rear-end                      | V1: Slowing or stopped in traffic / V2:Travelling straight ahead                    | V1:W / V2:W               | V1:(Collision with motor vehicle in traffic) V2:(Collision with motor vehicle in traffic)                                              | V1:(Passenger car) V2:(Passenger car)                                                                 |                                                     | Dry          | Dark - lighted roadway | Clear             | NEEDHAM ST / OAK ST         | Local police  |
| 4090290                                            | 9/17/2015  | Thursday  | 4:16 PM    | NEWTON    | Property damage only (none injured) | 0                           | 0                        | Angle                         | V1: Turning left / V2:Travelling straight ahead                                     | V1:E / V2:W               | V1:(Collision with motor vehicle in traffic) V2:(Collision with motor vehicle in traffic)                                              | V1:(Light truck(van, mini-van, panel, pickup, sport utility) with only four tires) V2:(Passenger car) |                                                     | Dry          | Daylight               | Clear/Clear       | NEEDHAM ST                  | Local police  |
| 2752388                                            | 8/10/2011  | Wednesday | 1:19 PM    | NEWTON    | Property damage only (none injured) | 0                           | 0                        | Rear-end                      | V1: Slowing or stopped in traffic / V2:Backing                                      | V1:N / V2:S               | V1:(Collision with motor vehicle in traffic) V2:(Collision with motor vehicle in traffic)                                              | V1:(Passenger car) V2:(Light truck(van, mini-van, panel, pickup, sport utility) with only             |                                                     | Dry          | Daylight               | Clear/Clear       | NEEDHAM ST / OAK ST         | Local police  |
| 2752392                                            | 8/12/2011  | Friday    | 6:01 PM    | NEWTON    | Non-fatal injury                    | 1                           | 0                        | Angle                         | V1: Turning right                                                                   | V1:S                      | V1:(Collision with cyclist (bicycle, tricycle, unicycle, pedal car))                                                                   | V1:(Passenger car)                                                                                    | P2:Pedalcyclist (bicycle, tricycle, unicycle, pedal | Dry          | Daylight               | Clear             | NEEDHAM ST / OAK ST         | Local police  |
| 2774361                                            | 9/13/2011  | Tuesday   | 11:00 AM   | NEWTON    | Non-fatal injury                    | 1                           | 0                        | Single vehicle                | V1: Not reported                                                                    | V1:8                      | V1:()                                                                                                                                  | V1:()                                                                                                 | P1:Pedestrian                                       | Dry          | Daylight               | Clear             | NEEDHAM ST / OAK STREET     | Local police  |
| 2776291                                            | 9/29/2011  | Thursday  | 9:16 AM    | NEWTON    | Property damage only (none injured) | 0                           | 0                        | Rear-end                      | V1: Slowing or stopped in traffic / V2:Slowing or stopped in traffic                | V1:W / V2:W               | V1:(Collision with motor vehicle in traffic) V2:(Collision with motor vehicle in traffic)                                              | V1:(Passenger car) V2:(Passenger car)                                                                 |                                                     | Wet          | Daylight               | Rain/Rain         | NEEDHAM ST                  | Local police  |
| 3114563                                            | 5/8/2012   | Tuesday   | 4:35 PM    | NEWTON    | Property damage only (none injured) | 0                           | 0                        | Sideswipe, same direction     | V1: Overtaking/passing / V2:Travelling straight ahead                               | V1:N / V2:N               | V1:(Collision with motor vehicle in traffic) V2:(Collision with motor vehicle in traffic)                                              | V1:(Light truck(van, mini-van, panel, pickup, sport utility) with only four tires) V2:(Passenger car) |                                                     | Dry          | Daylight               | Clear             | NEEDHAM ST / OAK ST         | Local police  |
| 3201796                                            | 7/1/2012   | Sunday    | 4:11 PM    | NEWTON    | Property damage only (none injured) | 0                           | 0                        | Sideswipe, same direction     | V1: Slowing or stopped in traffic / V2:Changing lanes                               | V1:N / V2:N               | V1:(Collision with motor vehicle in traffic) V2:(Collision with motor vehicle in traffic)                                              | V1:(Light truck(van, mini-van, panel, pickup, sport utility) with only four tires) V2:(Passenger car) |                                                     | Dry          | Daylight               | Cloudy            | NEEDHAM ST / OAK ST         | Local police  |
| 3370349                                            | 3/9/2013   | Saturday  | 7:37 AM    | NEWTON    | Property damage only (none injured) | 0                           | 0                        | Angle                         | V1: Travelling straight ahead / V2:Parked                                           | V1:E / V2:S               | V1:(Collision with motor vehicle in traffic) V2:(Collision with motor vehicle in traffic)                                              | V1:(Passenger car) V2:(Light truck(van, mini-van, panel, pickup, sport utility) with only             |                                                     | Dry          | Daylight               | Clear/Clear       | NEEDHAM ST / OAK ST         | Local police  |
| 4111027                                            | 11/12/2015 | Thursday  | 4:40 PM    | NEWTON    | Non-fatal injury                    | 1                           | 0                        | Rear-end                      | V1: Slowing or stopped in traffic / V2:Travelling straight ahead / V3:Turning right | V1:W / V2:W / V3:W        | V1:(Collision with motor vehicle in traffic) V2:(Collision with motor vehicle in traffic) V3:(Collision with motor vehicle in traffic) | V1:(Passenger car) V2:(Passenger car) V3:(Passenger car)                                              |                                                     | Wet          | Dusk                   | Rain              | NEEDHAM ST / OAK ST         | Local police  |
| 4115566                                            | 11/24/2015 | Tuesday   | 5:45 PM    | NEWTON    | Property damage only (none injured) | 0                           | 0                        | Angle                         | V1: Travelling straight ahead / V2:Turning left                                     | V1:S / V2:W               | V1:(Collision with motor vehicle in traffic) V2:(Collision with motor vehicle in traffic)                                              | V1:(Passenger car) V2:(Passenger car)                                                                 |                                                     | Dry          | Dark - lighted roadway | Clear             | NEEDHAM ST                  | Local police  |
| 4129820                                            | 12/21/2015 | Monday    | 9:01 AM    | NEWTON    | Property damage only (none injured) | 0                           | 0                        | Sideswipe, same direction     | V1: Entering traffic lane / V2:Slowing or stopped in traffic                        | V1:E / V2:E               | V1:(Collision with motor vehicle in traffic) V2:(Collision with motor vehicle in traffic)                                              | V1:(Light truck(van, mini-van, panel, pickup, sport utility) with only four tires) V2:(Passenger car) |                                                     | Dry          | Daylight               | Cloudy            | NEEDHAM ST / OAK ST         | Local police  |



| Crash Number                                                 | Crash Date | Weekday   | Crash Time | City/Town | Crash Severity                      | Number of NonFatal Injuries | Number of Fatal Injuries | Manner of Collision           | Vehicle Action Prior to Crash                                                 | Vehicle Travel Directions | Most Harmful Events                                                                                                                            | Vehicle Configuration                                                                                                                                                                                                     | Non Motorist Type | Road Surface | Ambient Light | Weather Condition | Roadway        | Police Agency |
|--------------------------------------------------------------|------------|-----------|------------|-----------|-------------------------------------|-----------------------------|--------------------------|-------------------------------|-------------------------------------------------------------------------------|---------------------------|------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------|--------------|---------------|-------------------|----------------|---------------|
| 7: Needham Street at South Site Driveway                     |            |           |            |           |                                     |                             |                          |                               |                                                                               |                           |                                                                                                                                                |                                                                                                                                                                                                                           |                   |              |               |                   |                |               |
| 3793829                                                      | 4/18/2014  | Friday    | 3:17 PM    | NEWTON    | Non-fatal injury                    | 2                           | 0                        | Rear-end                      | V1: Slowing or stopped in traffic / V2:Backing                                | V1:W / V2:N               | V1:(Collision with motor vehicle in traffic) V2:(Collision with motor vehicle in traffic)                                                      | V1:(Passenger car) V2:(Passenger car)                                                                                                                                                                                     |                   | Dry          | Daylight      | Cloudy            | NEEDHAM ST     | Local police  |
| 3027423                                                      | 4/3/2012   | Tuesday   | 4:39 PM    | NEWTON    | Not Reported                        | 0                           | 0                        | Angle                         | V1: Parked                                                                    | V1:W                      | V1:(Collision with parked motor vehicle)                                                                                                       | V1:(Passenger car)                                                                                                                                                                                                        |                   | Dry          | Daylight      | Clear             | NEEDHAM ST     | Local police  |
| 3993322                                                      | 1/8/2015   | Thursday  | 4:13 PM    | NEWTON    | Non-fatal injury                    | 3                           | 0                        | Head-on                       | V1: Travelling straight ahead / V2:Turning left                               | V1:W / V2:E               | V1:(Collision with motor vehicle in traffic) V2:(Collision with motor vehicle in traffic)                                                      | V1:(Passenger car) V2:(Passenger car)                                                                                                                                                                                     |                   | Dry          | Daylight      | Clear             | NEEDHAM ST     | Local police  |
| 3939149                                                      | 9/10/2014  | Wednesday | 11:08 AM   | NEWTON    | Property damage only (none injured) | 0                           | 0                        | Angle                         | V1: Travelling straight ahead / V2:Turning right                              | V1:E / V2:N               | V1:(Collision with motor vehicle in traffic) V2:(Collision with motor vehicle in traffic)                                                      | V1:(Passenger car) V2:(Passenger car)                                                                                                                                                                                     |                   | Dry          | Daylight      | Clear/Clear       | NEEDHAM ST     | Local police  |
| 3588652                                                      | 9/2/2013   | Monday    | 12:34 PM   | NEWTON    | Property damage only (none injured) | 0                           | 0                        | Rear-to-rear                  | V1: Backing / V2:Parked / V3:Parked                                           | V1:N / V2:U / V3:U        | V1:(Collision with parked motor vehicle) V2:(Collision with motor vehicle in traffic) V3:(Collision with motor vehicle in traffic)             | V1:(Light truck(van, mini-van, panel, pickup, sport utility) with only four tires) V2:(Light truck(van, mini-van, panel, pickup, sport utility) with only four tires) V3:(Light truck(van, mini-van, panel, pickup, sport |                   | Dry          | Daylight      | Cloudy            | NEEDHAM ST     | Local police  |
| 4118189                                                      | 11/30/2015 | Monday    | 3:45 PM    | NEWTON    | Not Reported                        | 0                           | 0                        | Unknown                       | V1: Parked                                                                    | V1:8                      | V1:()                                                                                                                                          | V1:(Passenger car)                                                                                                                                                                                                        |                   | Dry          | Dusk          | Cloudy            | NEEDHAM ST     | Local police  |
| 8: Needham Street at Middle Site Driveway / TJ Maxx Driveway |            |           |            |           |                                     |                             |                          |                               |                                                                               |                           |                                                                                                                                                |                                                                                                                                                                                                                           |                   |              |               |                   |                |               |
| 3772932                                                      | 3/17/2014  | Monday    | 6:11 PM    | NEWTON    | Property damage only                | 0                           | 0                        | Single vehicle                | V1: Turning right                                                             | V1:E                      | V1:()                                                                                                                                          | V1:(Passenger car)                                                                                                                                                                                                        |                   | Dry          | Daylight      | Clear             | NEEDHAM ST     | Local police  |
| 2875714                                                      | 1/14/2012  | Saturday  | 3:39 PM    | NEWTON    | Property damage only (none injured) | 0                           | 0                        | Sideswipe, opposite direction | V1: Slowing or stopped in traffic / V2:Travelling straight ahead              | V1:W / V2:E               | V1:(Collision with motor vehicle in traffic) V2:(Collision with motor vehicle in traffic)                                                      | V1:(Light truck(van, mini-van, panel, pickup, sport utility) with only four tires) V2:(Passenger car)                                                                                                                     |                   | Dry          | Daylight      | Clear/Clear       | NEEDHAM ST     | Local police  |
| 2954220                                                      | 3/10/2012  | Saturday  | 6:45 PM    | NEWTON    | Property damage only (none injured) | 0                           | 0                        | Angle                         | V1: Parked                                                                    | V1:8                      | V1:()                                                                                                                                          | V1:(Light truck(van, mini-van, panel, pickup, sport utility) with only four tires)                                                                                                                                        |                   | Dry          | Daylight      | Cloudy            | NEEDHAM ST     | Local police  |
| 3276253                                                      | 10/8/2012  | Monday    | 4:44 PM    | NEWTON    | Not Reported                        | 0                           | 0                        | Sideswipe, same direction     | V1: Travelling straight ahead / V2:Parked                                     | V1:W / V2:W               | V1:(Collision with parked motor vehicle) V2:(Collision with motor vehicle in traffic)                                                          | V1:(Passenger car) V2:(Passenger car)                                                                                                                                                                                     |                   | Dry          | Daylight      | Clear             | NEEDHAM ST     | Local police  |
| 3297783                                                      | 10/26/2012 | Friday    | 3:29 PM    | NEWTON    | Property damage only (none injured) | 0                           | 0                        | Angle                         | V1: Travelling straight ahead / V2:Entering traffic lane                      | V1:W / V2:S               | V1:(Collision with motor vehicle in traffic) V2:(Collision with motor vehicle in traffic)                                                      | V1:(Passenger car) V2:(Passenger car)                                                                                                                                                                                     |                   | Dry          | Daylight      | Clear             | NEEDHAM ST     | Local police  |
| 3974306                                                      | 11/8/2014  | Saturday  | 1:24 PM    | NEWTON    | Property damage only (none injured) | 0                           | 0                        | Angle                         | V1: Slowing or stopped in traffic / V2:Backing                                | V1:E / V2:S               | V1:(Other non-collision) V2:(Collision with parked motor vehicle)                                                                              | V1:(Light truck(van, mini-van, panel, pickup, sport utility) with only four tires) V2:(Passenger car)                                                                                                                     |                   | Dry          | Daylight      | Clear             | NEEDHAM ST     | Local police  |
| 4082082                                                      | 8/29/2015  | Saturday  | 2:22 PM    | NEWTON    | Property damage only (none injured) | 0                           | 0                        | Rear-to-rear                  | V1: Backing / V2:Backing                                                      | V1:6 / V2:6               | V1:(Collision with motor vehicle in traffic) V2:(Collision with motor vehicle in traffic)                                                      | V1:(Passenger car) V2:(Passenger car)                                                                                                                                                                                     |                   | Dry          | Daylight      | Clear             | NEEDHAM ST     | Local police  |
| 3041318                                                      | 4/13/2012  | Friday    | 4:35 PM    | NEWTON    | Property damage only (none injured) | 0                           | 0                        | Sideswipe, same direction     | V1: Turning right / V2:Travelling straight ahead                              | V1:N / V2:N               | V1:(Collision with motor vehicle in traffic) V2:(Collision with motor vehicle in traffic)                                                      | V1:(Passenger car) V2:(Passenger car)                                                                                                                                                                                     |                   | Dry          | Daylight      | Clear/Unknown     | NEEDHAM ST     | Local police  |
| 3347073                                                      | 1/11/2013  | Friday    | 2:01 PM    | NEWTON    | Not Reported                        | 0                           | 0                        | Sideswipe, same               | V1: Parked                                                                    | V1:U                      | V1:(Collision with motor vehicle in traffic)                                                                                                   | V1:(Passenger car)                                                                                                                                                                                                        |                   | Dry          | Daylight      | Clear             | NEEDHAM ST     | Local police  |
| 3397906                                                      | 4/17/2013  | Wednesday | 5:29 PM    | NEWTON    | Property damage only (none injured) | 0                           | 0                        | Sideswipe, same               | V1: Parked                                                                    | V1:S                      | V1:(Collision with parked motor vehicle)                                                                                                       | V1:(Passenger car)                                                                                                                                                                                                        |                   | Dry          | Daylight      | Clear             | NEEDHAM ST     | Local police  |
| 3949620                                                      | 9/4/2014   | Thursday  | 3:45 PM    | NEWTON    | Non-fatal injury                    | 1                           | 0                        | Not reported                  | V1: Turning left / V2:Turning left                                            | V1:N / V2:N               | V1:(Other non-collision) V2:(Other non-collision)                                                                                              | V1:(Motorcycle) V2:(Passenger car)                                                                                                                                                                                        |                   | Dry          | Daylight      | Clear             | NEEDHAM STREET | Local police  |
| 3201821                                                      | 7/16/2012  | Monday    | 6:14 PM    | NEWTON    | Property damage only (none injured) | 0                           | 0                        | Rear-end                      | V1: Travelling straight ahead / V2:Slowing or stopped in traffic              | V1:W / V2:W               | V1:(Collision with motor vehicle in traffic) V2:(Collision with motor vehicle in traffic)                                                      | V1:(Passenger car) V2:(Passenger car)                                                                                                                                                                                     |                   | Dry          | Daylight      | Clear             | NEEDHAM ST     | Local police  |
| 3588749                                                      | 8/31/2013  | Saturday  | 5:13 PM    | NEWTON    | Property damage only (none injured) | 0                           | 0                        | Angle                         | V1: Parked / V2:Backing                                                       | V1:N / V2:S               | V1:(Collision with motor vehicle in traffic) V2:(Collision with parked motor vehicle)                                                          | V1:(Light truck(van, mini-van, panel, pickup, sport utility) with only four tires) V2:(Light truck(van, mini-van, panel, pickup, sport utility) with only                                                                 |                   | Dry          | Daylight      | Cloudy            | NEEDHAM ST     | Local police  |
| 3592176                                                      | 9/11/2013  | Wednesday | 2:55 PM    | NEWTON    | Property damage only (none injured) | 0                           | 0                        | Rear-to-rear                  | V1: Backing / V2:Turning right                                                | V1:S / V2:S               | V1:(Collision with motor vehicle in traffic) V2:(Collision with motor vehicle in traffic)                                                      | V1:(Light truck(van, mini-van, panel, pickup, sport utility) with only four tires) V2:(Passenger car)                                                                                                                     |                   | Dry          | Daylight      | Clear/Clear       | NEEDHAM ST     | Local police  |
| 4137052                                                      | 12/31/2015 | Thursday  | 11:34 AM   | NEWTON    | Property damage only (none injured) | 0                           | 0                        | Angle                         | V1: Backing / V2:Slowing or stopped in traffic / V3:Travelling straight ahead | V1:W / V2:S / V3:S        | V1:(Collision with light pole or other post/support) V2:(Collision with motor vehicle in traffic) V3:(Collision with motor vehicle in traffic) | V1:(Light truck(van, mini-van, panel, pickup, sport utility) with only four tires) V2:(Passenger car) V3:(Light truck(van, mini-van, panel, pickup, sport utility) with                                                   |                   | Wet          | Daylight      | Clear/Cloudy      | NEEDHAM ST     | Local police  |

| Crash Number                                                 | Crash Date | Weekday   | Crash Time | City/Town | Crash Severity                      | Number of NonFatal Injuries | Number of Fatal Injuries | Manner of Collision       | Vehicle Action Prior to Crash                                                                           | Vehicle Travel Directions | Most Harmful Events                                                                                                                    | Vehicle Configuration                                                                                                                                     | Non Motorist Type                                   | Road Surface | Ambient Light          | Weather Condition | Roadway                    | Police Agency |
|--------------------------------------------------------------|------------|-----------|------------|-----------|-------------------------------------|-----------------------------|--------------------------|---------------------------|---------------------------------------------------------------------------------------------------------|---------------------------|----------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------|--------------|------------------------|-------------------|----------------------------|---------------|
| 9: Needham Street at Charlemont Street / North Site Driveway |            |           |            |           |                                     |                             |                          |                           |                                                                                                         |                           |                                                                                                                                        |                                                                                                                                                           |                                                     |              |                        |                   |                            |               |
| 2693896                                                      | 2/19/2011  | Saturday  | 11:55 AM   | NEWTON    | Not Reported                        | 0                           | 0                        | Rear-to-rear              | V1: Parked / V2:Backing                                                                                 | V1:E / V2:E               | V1:(Collision with parked motor vehicle) V2:(Collision with parked motor vehicle)                                                      | V1:(Passenger car) V2:(Light truck(van, mini-van, panel, pickup, sport utility) with only                                                                 |                                                     | Dry          | Daylight               | Clear             | NEEDHAM ST                 | Local police  |
| 2708871                                                      | 3/17/2011  | Thursday  | 5:53 PM    | NEWTON    | Non-fatal injury                    | 1                           | 0                        | Rear-end                  | V1: Slowing or stopped in traffic / V2:Slowing or stopped in traffic / V3:Slowing or stopped in traffic | V1:W / V2:W / V3:W        | V1:(Collision with motor vehicle in traffic) V2:(Collision with motor vehicle in traffic) V3:(Collision with motor vehicle in traffic) | V1:(Light truck(van, mini-van, panel, pickup, sport utility) with only four tires) V2:(Light truck(van, mini-van, panel, pickup, sport utility) with only |                                                     | Dry          | Daylight               | Clear             | NEEDHAM ST                 | Local police  |
| 2898020                                                      | 1/27/2012  | Friday    | 3:02 PM    | NEWTON    | Property damage only (none injured) | 0                           | 0                        | Angle                     | V1: Travelling straight ahead / V2:Turning left                                                         | V1:E / V2:N               | V1:(Collision with motor vehicle in traffic) V2:(Collision with motor vehicle in traffic)                                              | V1:(Passenger car) V2:(Light truck(van, mini-van, panel, pickup, sport utility) with only                                                                 |                                                     | Wet          | Daylight               | Rain              | NEEDHAM ST / CHARLEMONT ST | Local police  |
| 3451114                                                      | 5/23/2013  | Thursday  | 3:27 PM    | NEWTON    | Non-fatal injury                    | 1                           | 0                        | Single vehicle crash      | V1: Travelling straight ahead                                                                           | V1:W                      | V1:(Collision with pedestrian)                                                                                                         | V1:(Light truck(van, mini-van, panel, pickup, sport utility) with only four tires)                                                                        | P2:Pedestrian                                       | Dry          | Daylight               | Cloudy            | NEEDHAM ST                 | Local police  |
| 3451125                                                      | 5/30/2013  | Thursday  | 1:13 PM    | NEWTON    | Property damage only (none injured) | 0                           | 0                        | Angle                     | V1: Turning right / V2:Travelling straight ahead                                                        | V1:W / V2:W               | V1:(Collision with motor vehicle in traffic) V2:(Collision with motor vehicle in traffic)                                              | V1:(Passenger car) V2:(Passenger car)                                                                                                                     |                                                     | Dry          | Daylight               | Clear/Clear       | CHARLEMONT ST / NEEDHAM ST | Local police  |
| 3479266                                                      | 6/15/2013  | Saturday  | 9:58 PM    | NEWTON    | Property damage only (none injured) | 0                           | 0                        | Rear-end                  | V1: Slowing or stopped in traffic                                                                       | V1:E                      | V1:(Collision with motor vehicle in traffic)                                                                                           | V1:(Passenger car)                                                                                                                                        |                                                     | Dry          | Dark - lighted roadway | Clear             | NEEDHAM ST                 | Local police  |
| 3492918                                                      | 6/25/2013  | Tuesday   | 7:26 PM    | NEWTON    | Property damage only (none injured) | 0                           | 0                        | Angle                     | V1: Entering traffic lane / V2:Travelling straight ahead                                                | V1:E / V2:E               | V1:(Collision with motor vehicle in traffic) V2:(Collision with motor vehicle in traffic)                                              | V1:(Passenger car) V2:(Light truck(van, mini-van, panel, pickup, sport utility) with only                                                                 |                                                     | Dry          | Daylight               | Clear             | NEEDHAM ST                 | Local police  |
| 3974288                                                      | 11/11/2014 | Tuesday   | 4:00 PM    | NEWTON    | Property damage only (none injured) | 0                           | 0                        | Sideswipe, same direction | V1: Turning right / V2:Parked                                                                           | V1:N / V2:8               | V1:(Collision with parked motor vehicle) V2:()                                                                                         | V1:(Light truck(van, mini-van, panel, pickup, sport utility) with only four tires) V2:(Passenger car)                                                     |                                                     | Dry          | Daylight               | Clear             | CHARLEMONT ST / NEEDHAM ST | Local police  |
| 4072420                                                      | 7/3/2015   | Friday    | 1:24 PM    | NEWTON    | Property damage only                | 0                           | 0                        | Single vehicle            | V1: Turning right                                                                                       | V1:S                      | V1:(Collision with utility pole)                                                                                                       | V1:(Passenger car)                                                                                                                                        |                                                     | Dry          | Daylight               | Clear             | NEEDHAM ST                 | Local police  |
| 2727166                                                      | 5/16/2011  | Monday    | 5:25 PM    | NEWTON    | Property damage only (none injured) | 0                           | 0                        | Head-on                   | V1: Turning left / V2:Turning left                                                                      | V1:E / V2:W               | V1:(Collision with motor vehicle in traffic) V2:(Collision with motor vehicle in traffic)                                              | V1:(Passenger car) V2:(Light truck(van, mini-van, panel, pickup, sport utility) with only                                                                 |                                                     | Wet          | Daylight               | Cloudy/Rain       | NEEDHAM ST                 | Local police  |
| 3347103                                                      | 1/20/2013  | Sunday    | 4:24 PM    | NEWTON    | Not Reported                        | 0                           | 0                        | Angle                     | V1: Parked                                                                                              | V1:U                      | V1:(Collision with motor vehicle in traffic)                                                                                           | V1:(Passenger car)                                                                                                                                        |                                                     | Dry          | Daylight               | Cloudy            | NEEDHAM ST                 | Local police  |
| 3599964                                                      | 9/25/2013  | Wednesday | 11:12 AM   | NEWTON    | Property damage only (none injured) | 0                           | 0                        | Rear-end                  | V1: Travelling straight ahead / V2:Slowing or stopped in traffic                                        | V1:E / V2:E               | V1:(Collision with motor vehicle in traffic) V2:(Collision with motor vehicle in traffic)                                              | V1:(Passenger car) V2:(Passenger car)                                                                                                                     |                                                     | Dry          | Daylight               | Clear/Clear       | CHARLEMONT ST / NEEDHAM ST | Local police  |
| 3822673                                                      | 5/12/2014  | Monday    | 6:05 PM    | NEWTON    | Non-fatal injury                    | 4                           | 0                        | Angle                     | V1: Travelling straight ahead / V2:Entering traffic lane                                                | V1:E / V2:W               | V1:(Collision with motor vehicle in traffic) V2:(Collision with motor vehicle in traffic)                                              | V1:(Passenger car) V2:(Passenger car)                                                                                                                     |                                                     | Dry          | Daylight               | Clear             | CHARLEMONT ST / NEEDHAM ST | Local police  |
| 3826189                                                      | 6/1/2014   | Sunday    | 3:29 PM    | NEWTON    | Property damage only (none injured) | 0                           | 0                        | Rear-end                  | V1: Slowing or stopped in traffic / V2:Travelling straight ahead                                        | V1:E / V2:E               | V1:(Collision with motor vehicle in traffic) V2:(Collision with motor vehicle in traffic)                                              | V1:(Light truck(van, mini-van, panel, pickup, sport utility) with only four tires) V2:(Passenger car)                                                     |                                                     | Dry          | Daylight               | Clear/Clear       | NEEDHAM ST                 | Local police  |
| 4090288                                                      | 9/14/2015  | Monday    | 4:59 PM    | NEWTON    | Non-fatal injury                    | 1                           | 0                        | Angle                     | V1: Travelling straight ahead / V2:Entering traffic lane                                                | V1:E / V2:N               | V1:(Collision with motor vehicle in traffic) V2:(Collision with motor vehicle in traffic)                                              | V1:(Passenger car) V2:(Passenger car)                                                                                                                     |                                                     | Dry          | Daylight               | Clear             | CHARLEMONT ST / NEEDHAM ST | Local police  |
| 2791714                                                      | 11/7/2011  | Monday    | 2:22 AM    | NEWTON    | Property damage only (none injured) | 0                           | 0                        | Single vehicle crash      | V1: Travelling straight ahead                                                                           | V1:N                      | V1:(Collision with light pole or other post/support)                                                                                   | V1:(Passenger car)                                                                                                                                        |                                                     | Dry          | Other                  | Clear             | NEEDHAM ST                 | Local police  |
| 3219342                                                      | 7/25/2012  | Wednesday | 7:44 PM    | NEWTON    | Property damage only (none injured) | 0                           | 0                        | Angle                     | V1: Parked                                                                                              | V1:8                      | V1:(Collision with parked motor vehicle)                                                                                               | V1:(Passenger car)                                                                                                                                        |                                                     | Dry          | Daylight               | Clear             | NEEDHAM ST                 | Local police  |
| 3709733                                                      | 12/27/2013 | Friday    | 1:37 PM    | NEWTON    | Not Reported                        | 0                           | 0                        | Unknown                   | V1: Parked / V2:Unknown                                                                                 | V1:N / V2:U               | V1:(Collision with motor vehicle in traffic) V2:()                                                                                     | V1:(Passenger car) V2:()                                                                                                                                  |                                                     | Dry          | Daylight               | Clear             | NEEDHAM ST                 | Local police  |
| 3939156                                                      | 9/5/2014   | Friday    | 2:57 PM    | NEWTON    | Property damage only (none injured) | 0                           | 0                        | Rear-end                  | V1: Slowing or stopped in traffic / V2:Slowing or stopped in traffic / V3:Travelling straight ahead     | V1:E / V2:E / V3:E        | V1:(Collision with motor vehicle in traffic) V2:(Collision with motor vehicle in traffic) V3:(Collision with motor vehicle in traffic) | V1:(Light truck(van, mini-van, panel, pickup, sport utility) with only four tires) V2:(Light truck(van, mini-van, panel, pickup, sport utility) with only |                                                     | Dry          | Daylight               | Clear             | NEEDHAM ST                 | Local police  |
| 3953255                                                      | 9/24/2014  | Wednesday | 1:13 PM    | NEWTON    | Non-fatal injury                    | 1                           | 0                        | Single vehicle crash      | V1: Travelling straight ahead                                                                           | V1:N                      | V1:(Collision with pedestrian)                                                                                                         | V1:(Light truck(van, mini-van, panel, pickup, sport utility) with only four tires)                                                                        | P2:Pedestrian                                       | Dry          | Daylight               | Clear             | NEEDHAM ST                 | Local police  |
| 3957274                                                      | 9/21/2014  | Sunday    | 4:21 PM    | NEWTON    | Property damage only (none injured) | 0                           | 0                        | Angle                     | V1: Slowing or stopped in traffic                                                                       | V1:W                      | V1:(Collision with pedestrian)                                                                                                         | V1:(Passenger car)                                                                                                                                        | P3:Pedalcyclist (bicycle, tricycle, unicycle, pedal | Wet          | Daylight               | Cloudy/Rain       | CHARLEMONT ST / NEEDHAM ST | Local police  |
| 4038584                                                      | 4/22/2015  | Wednesday | 1:21 PM    | NEWTON    | Property damage only (none injured) | 0                           | 0                        | Rear-end                  | V1: Slowing or stopped in traffic / V2:Travelling straight ahead                                        | V1:E / V2:E               | V1:(Collision with motor vehicle in traffic) V2:(Collision with motor vehicle in traffic)                                              | V1:(Light truck(van, mini-van, panel, pickup, sport utility) with only four tires) V2:(Passenger car)                                                     |                                                     | Dry          | Daylight               | Clear             | NEEDHAM ST                 | Local police  |

| Crash Number                                                 | Crash Date | Weekday   | Crash Time | City/Town | Crash Severity                      | Number of NonFatal Injuries | Number of Fatal Injuries | Manner of Collision  | Vehicle Action Prior to Crash                                                                       | Vehicle Travel Directions | Most Harmful Events                                                                                                                    | Vehicle Configuration                                                                                                                                     | Non Motorist Type                                   | Road Surface | Ambient Light              | Weather Condition | Roadway                            | Police Agency |
|--------------------------------------------------------------|------------|-----------|------------|-----------|-------------------------------------|-----------------------------|--------------------------|----------------------|-----------------------------------------------------------------------------------------------------|---------------------------|----------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------|--------------|----------------------------|-------------------|------------------------------------|---------------|
| 9: Needham Street at Charlemont Street / North Site Driveway |            |           |            |           |                                     |                             |                          |                      |                                                                                                     |                           |                                                                                                                                        |                                                                                                                                                           |                                                     |              |                            |                   |                                    |               |
| 2747161                                                      | 7/25/2011  | Monday    | 5:10 PM    | NEWTON    | Non-fatal injury                    | 1                           | 0                        | Single vehicle crash | V1: Turning left                                                                                    | V1:E                      | V1:(Collision with cyclist (bicycle, tricycle, unicycle, pedal car))                                                                   | V1:(Passenger car)                                                                                                                                        | P2:Pedalcyclist (bicycle, tricycle, unicycle, pedal | Wet          | Daylight                   | Rain              | NEEDHAM ST                         | Local police  |
| 2755673                                                      | 8/24/2011  | Wednesday | 11:03 AM   | NEWTON    | Property damage only (none injured) | 0                           | 0                        | Angle                | V1: Turning right / V2:Travelling straight ahead                                                    | V1:E / V2:E               | V1:(Collision with motor vehicle in traffic) V2:(Collision with motor vehicle in traffic)                                              | V1:(Passenger car) V2:(Passenger car)                                                                                                                     |                                                     | Dry          | Daylight                   | Clear             | NEEDHAM ST                         | Local police  |
| 2774364                                                      | 9/15/2011  | Thursday  | 12:16 PM   | NEWTON    | Property damage only (none injured) | 0                           | 0                        | Angle                | V1: Travelling straight ahead / V2:Travelling straight ahead                                        | V1:S / V2:W               | V1:(Collision with motor vehicle in traffic) V2:(Collision with motor vehicle in traffic)                                              | V1:(Passenger car) V2:(Passenger car)                                                                                                                     |                                                     | Dry          | Daylight                   | Cloudy            | NEEDHAM ST                         | Local police  |
| 2780209                                                      | 9/20/2011  | Tuesday   | 7:43 PM    | NEWTON    | Not Reported                        | 0                           | 0                        | Angle                | V1: Parked / V2:Backing                                                                             | V1:S / V2:U               | V1:(Collision with motor vehicle in traffic) V2:(Collision with parked motor vehicle)                                                  | V1:(Passenger car) V2:(Passenger car)                                                                                                                     |                                                     | Wet          | Daylight                   | Cloudy            | NEEDHAM ST                         | Local police  |
| 2782891                                                      | 10/5/2011  | Wednesday | 2:33 PM    | NEWTON    | Property damage only (none injured) | 0                           | 0                        | Rear-end             | V1: Slowing or stopped in traffic / V2:Slowing or stopped in traffic / V3:Travelling straight ahead | V1:E / V2:E / V3:E        | V1:(Collision with motor vehicle in traffic) V2:(Collision with motor vehicle in traffic) V3:(Collision with motor vehicle in traffic) | V1:(Passenger car) V2:(Light truck(van, mini-van, panel, pickup, sport utility) with only four tires) V3:(Passenger car)                                  |                                                     | Dry          | Daylight                   | Clear             | CHARLEMONT ST / NEEDHAM ST         | Local police  |
| 3114486                                                      | 5/17/2012  | Thursday  | 6:03 PM    | NEWTON    | Non-fatal injury                    | 3                           | 0                        | Angle                | V1: Entering traffic lane / V2:Travelling straight ahead                                            | V1:E / V2:E               | V1:(Collision with motor vehicle in traffic) V2:(Collision with motor vehicle in traffic)                                              | V1:(Passenger car) V2:(Passenger car)                                                                                                                     |                                                     | Dry          | Daylight                   | Clear             | NEEDHAM ST                         | Local police  |
| 3118585                                                      | 4/14/2012  | Saturday  | 5:50 PM    | NEWTON    | Property damage only (none injured) | 0                           | 0                        | Unknown              | V1: Parked / V2:Parked                                                                              | V1:U / V2:U               | V1:(Collision with motor vehicle in traffic) V2:(Collision with parked motor vehicle)                                                  | V1:(Passenger car) V2:(Passenger car)                                                                                                                     |                                                     | Dry          | Daylight                   | Clear/Unknown     | NEEDHAM ST                         | Local police  |
| 3140053                                                      | 5/22/2012  | Tuesday   | 7:51 PM    | NEWTON    | Property damage only (none injured) | 0                           | 0                        | Angle                | V1: Travelling straight ahead / V2:Parked                                                           | V1:E / V2:S               | V1:(Collision with motor vehicle in traffic) V2:(Collision with motor vehicle in traffic)                                              | V1:(Passenger car) V2:(Passenger car)                                                                                                                     |                                                     | Wet          | Dark - roadway not lighted | Rain/Cloudy       | NEEDHAM ST                         | Local police  |
| 3665341                                                      | 10/30/2013 | Wednesday | 6:46 PM    | NEWTON    | Property damage only (none injured) | 0                           | 0                        | Angle                | V1: Entering traffic lane / V2:Travelling straight ahead                                            | V1:W / V2:N               | V1:(Collision with motor vehicle in traffic) V2:(Collision with motor vehicle in traffic)                                              | V1:(Passenger car) V2:(Passenger car)                                                                                                                     |                                                     | Dry          | Dusk                       | Clear/Clear       | NEEDHAM ST                         | Local police  |
| 4027459                                                      | 3/17/2015  | Tuesday   | 6:35 PM    | NEWTON    | Property damage only (none injured) | 0                           | 0                        | Rear-end             | V1: Parked / V2:Unknown                                                                             | V1:U / V2:U               | V1:(Collision with parked motor vehicle) V2:(Collision with parked motor vehicle)                                                      | V1:(Passenger car) V2:()                                                                                                                                  |                                                     | Dry          | Dusk                       | Clear             | NEEDHAM ST                         | Local police  |
| 4035602                                                      | 4/14/2015  | Tuesday   | 7:05 PM    | NEWTON    | Non-fatal injury                    | 3                           | 0                        | Angle                | V1: Travelling straight ahead / V2:Entering traffic lane                                            | V1:W / V2:N               | V1:(Collision with motor vehicle in traffic) V2:(Collision with motor vehicle in traffic)                                              | V1:(Passenger car) V2:(Passenger car)                                                                                                                     |                                                     | Dry          | Dusk                       | Clear             | NEEDHAM STREET / CHARLEMONT STREET | Local police  |
| 4124471                                                      | 12/15/2015 | Tuesday   | 10:51 AM   | NEWTON    | Property damage only (none injured) | 0                           | 0                        | Angle                | V1: Travelling straight ahead / V2:Turning left                                                     | V1:E / V2:N               | V1:(Collision with motor vehicle in traffic) V2:(Collision with motor vehicle in traffic)                                              | V1:(Light truck(van, mini-van, panel, pickup, sport utility) with only four tires) V2:(Passenger car)                                                     |                                                     | Dry          | Daylight                   | Clear             | CHARLEMONT ST / NEEDHAM ST         | Local police  |
| 4129822                                                      | 12/22/2015 | Tuesday   | 6:44 AM    | NEWTON    | Property damage only (none injured) | 0                           | 0                        | Angle                | V1: Turning left / V2:Travelling straight ahead                                                     | V1:W / V2:E               | V1:(Collision with motor vehicle in traffic) V2:(Collision with motor vehicle in traffic)                                              | V1:(Light truck(van, mini-van, panel, pickup, sport utility) with only four tires) V2:(Light truck(van, mini-van, panel, pickup, sport utility) with only |                                                     | Wet          | Dawn                       | Rain              | NEEDHAM ST                         | Local police  |
| 10: Needham Street at Tower Road / Industrial Place          |            |           |            |           |                                     |                             |                          |                      |                                                                                                     |                           |                                                                                                                                        |                                                                                                                                                           |                                                     |              |                            |                   |                                    |               |
| 2785704                                                      | 10/5/2011  | Wednesday | 4:35 PM    | NEWTON    | Property damage only (none injured) | 0                           | 0                        | Angle                | V1: Travelling straight ahead / V2:Turning left                                                     | V1:W / V2:N               | V1:(Collision with motor vehicle in traffic) V2:(Collision with motor vehicle in traffic)                                              | V1:(Light truck(van, mini-van, panel, pickup, sport utility) with only four tires) V2:(Light truck(van, mini-van, panel, pickup, sport utility) with only |                                                     | Dry          | Daylight                   | Clear/Clear       | INDUSTRIAL PL / NEEDHAM ST         | Local police  |
| 2785908                                                      | 10/19/2011 | Wednesday | 8:16 PM    | NEWTON    | Property damage only (none injured) | 0                           | 0                        | Angle                | V1: Backing / V2:Parked                                                                             | V1:U / V2:U               | V1:(Collision with parked motor vehicle) V2:(Collision with motor vehicle in traffic)                                                  | V1:(Passenger car) V2:(Passenger car)                                                                                                                     |                                                     | Wet          | Dark - lighted roadway     | Rain              | NEEDHAM ST                         | Local police  |
| 2794171                                                      | 11/3/2011  | Thursday  | 3:50 PM    | NEWTON    | Property damage only (none injured) | 0                           | 0                        | Not reported         | V1: Turning right                                                                                   | V1:U                      | V1:()                                                                                                                                  | V1:(Passenger car)                                                                                                                                        |                                                     | Not reported | Not reported               | Not Reported      | NEEDHAM ST                         | Local police  |
| 2794173                                                      | 11/6/2011  | Sunday    | 1:43 PM    | NEWTON    | Property damage only (none injured) | 0                           | 0                        | Rear-end             | V1: Slowing or stopped in traffic / V2:Travelling straight ahead                                    | V1:N / V2:N               | V1:(Collision with motor vehicle in traffic) V2:(Collision with motor vehicle in traffic)                                              | V1:(Passenger car) V2:(Light truck(van, mini-van, panel, pickup, sport utility) with only                                                                 |                                                     | Dry          | Daylight                   | Clear             | NEEDHAM ST / TOWER RD              | Local police  |
| 2836608                                                      | 12/21/2011 | Wednesday | 9:44 AM    | NEWTON    | Property damage only (none injured) | 0                           | 0                        | Rear-end             | V1: Backing / V2:Slowing or stopped in traffic                                                      | V1:8 / V2:8               | V1:(Collision with motor vehicle in traffic) V2:(Collision with motor vehicle in traffic)                                              | V1:(Unknown heavy truck, cannot classify) V2:(Passenger car)                                                                                              |                                                     | Dry          | Daylight                   | Cloudy/Cloudy     | TOWER ROAD                         | Local police  |
| 3252630                                                      | 9/14/2012  | Friday    | 6:32 PM    | NEWTON    | Property damage only (none injured) | 0                           | 0                        | Rear-end             | V1: Travelling straight ahead / V2:Slowing or stopped in traffic                                    | V1:W / V2:W               | V1:(Collision with motor vehicle in traffic) V2:(Collision with motor vehicle in traffic)                                              | V1:(Passenger car) V2:(Light truck(van, mini-van, panel, pickup, sport utility) with only                                                                 |                                                     | Dry          | Daylight                   | Clear             | NEEDHAM ST                         | Local police  |

| Crash Number                                        | Crash Date | Weekday   | Crash Time | City/Town | Crash Severity                      | Number of NonFatal Injuries | Number of Fatal Injuries | Manner of Collision       | Vehicle Action Prior to Crash                                                                           | Vehicle Travel Directions | Most Harmful Events                                                                                                                    | Vehicle Configuration                                                                                                                                     | Non Motorist Type | Road Surface | Ambient Light          | Weather Condition | Roadway                          | Police Agency |
|-----------------------------------------------------|------------|-----------|------------|-----------|-------------------------------------|-----------------------------|--------------------------|---------------------------|---------------------------------------------------------------------------------------------------------|---------------------------|----------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------|--------------|------------------------|-------------------|----------------------------------|---------------|
| 10: Needham Street at Tower Road / Industrial Place |            |           |            |           |                                     |                             |                          |                           |                                                                                                         |                           |                                                                                                                                        |                                                                                                                                                           |                   |              |                        |                   |                                  |               |
| 3822664                                             | 4/13/2014  | Sunday    | 5:49 PM    | NEWTON    | Non-fatal injury                    | 1                           | 0                        | Rear-to-rear              | V1: Backing / V2:Parked                                                                                 | V1:N / V2:N               | V1:(Collision with parked motor vehicle) V2:(Collision with motor vehicle in traffic)                                                  | V1:(Passenger car) V2:(Passenger car)                                                                                                                     |                   | Dry          | Daylight               | Clear             | NEEDHAM ST                       | Local police  |
| 4034770                                             | 3/28/2015  | Saturday  | 12:10 PM   | NEWTON    | Property damage only (none injured) | 0                           | 0                        | Angle                     | V1: Turning left / V2:Travelling straight ahead                                                         | V1:N / V2:E               | V1:(Collision with motor vehicle in traffic) V2:(Collision with motor vehicle in traffic)                                              | V1:(Passenger car) V2:(Passenger car)                                                                                                                     |                   | Wet          | Daylight               | Snow              | INDUSTRIAL PL / NEEDHAM ST       | Local police  |
| 2689696                                             | 1/28/2011  | Friday    | 2:56 PM    | NEWTON    | Not Reported                        | 0                           | 0                        | Angle                     | V1: Parked / V2:Backing                                                                                 | V1:U / V2:U               | V1:(Collision with motor vehicle in traffic) V2:(Collision with parked motor vehicle)                                                  | V1:(Passenger car) V2:(Passenger car)                                                                                                                     |                   | Wet          | Daylight               | Clear             | TOWER RD                         | Local police  |
| 2693878                                             | 2/13/2011  | Sunday    | 3:34 PM    | NEWTON    | Property damage only (none injured) | 0                           | 0                        | Angle                     | V1: Travelling straight ahead / V2:Leaving traffic lane                                                 | V1:S / V2:N               | V1:() V2:(Collision with motor vehicle in traffic)                                                                                     | V1:(Passenger car) V2:(Passenger car)                                                                                                                     |                   | Dry          | Daylight               | Clear             | TOWER RD                         | Local police  |
| 2898016                                             | 1/17/2012  | Tuesday   | 6:52 PM    | NEWTON    | Property damage only (none injured) | 0                           | 0                        | Head-on                   | V1: Backing / V2:Slowing or stopped in traffic                                                          | V1:E / V2:W               | V1:(Collision with motor vehicle in traffic) V2:(Collision with motor vehicle in traffic)                                              | V1:(Passenger car) V2:(Passenger car)                                                                                                                     |                   | Wet          | Dark - lighted roadway | Rain              | INDUSTRIAL PL / NEEDHAM ST       | Local police  |
| 3368667                                             | 2/27/2013  | Wednesday | 9:25 PM    | NEWTON    | Not Reported                        | 0                           | 0                        | Sideswipe, same           | V1: Parked                                                                                              | V1:S                      | V1:(Collision with parked motor vehicle)                                                                                               | V1:(Passenger car)                                                                                                                                        |                   | Dry          | Dark - lighted roadway | Clear             | NEEDHAM ST                       | Local police  |
| 3981611                                             | 11/25/2014 | Tuesday   | 7:02 PM    | NEWTON    | Non-fatal injury                    | 8                           | 0                        | Rear-end                  | V1: Slowing or stopped in traffic / V2:Slowing or stopped in traffic / V3:Slowing or stopped in traffic | V1:W / V2:W / V3:W        | V1:(Collision with motor vehicle in traffic) V2:(Collision with motor vehicle in traffic) V3:()                                        | V1:(Passenger car) V2:(Passenger car) V3:(Passenger car)                                                                                                  |                   | Dry          | Dark - lighted roadway | Cloudy            | NEEDHAM ST                       | Local police  |
| 4070103                                             | 7/10/2015  | Friday    | 2:19 PM    | NEWTON    | Property damage only (none injured) | 0                           | 0                        | Angle                     | V1: Turning right / V2:Travelling straight ahead                                                        | V1:N / V2:N               | V1:(Collision with motor vehicle in traffic) V2:(Collision with motor vehicle in traffic)                                              | V1:(Passenger car) V2:(Passenger car)                                                                                                                     |                   | Dry          | Daylight               | Clear             | NEEDHAM ST                       | Local police  |
| 2727173                                             | 5/26/2011  | Thursday  | 11:44 AM   | NEWTON    | Property damage only (none injured) | 0                           | 0                        | Not reported              | V1: Travelling straight ahead                                                                           | V1:W                      | V1:(Collision with motor vehicle in traffic)                                                                                           | V1:(Passenger car)                                                                                                                                        |                   | Not reported | Not reported           | Not Reported      | NEEDHAM ST / TOWER RD            | Local police  |
| 2736955                                             | 5/25/2011  | Wednesday | 6:02 PM    | NEWTON    | Property damage only (none injured) | 0                           | 0                        | Rear-end                  | V1: Travelling straight ahead / V2:Travelling straight ahead                                            | V1:W                      | V1:(Collision with motor vehicle in traffic)                                                                                           | V1:(Passenger car)                                                                                                                                        |                   | Dry          | Daylight               | Clear/Clear       | NEEDHAM ST                       | Local police  |
| 3102144                                             | 5/9/2012   | Wednesday | 4:52 PM    | NEWTON    | Property damage only (none injured) | 0                           | 0                        | Sideswipe, same direction | V1: Parked / V2:Turning left                                                                            | V1:U / V2:8               | V1:(Collision with motor vehicle in traffic) V2:(Collision with parked motor vehicle)                                                  | V1:(Passenger car) V2:(Passenger car)                                                                                                                     |                   | Wet          | Daylight               | Cloudy/Rain       | TOWER RD                         | Local police  |
| 3541291                                             | 6/14/2013  | Friday    | 6:48 PM    | NEWTON    | Property damage only (none injured) | 0                           | 0                        | Rear-end                  | V1: Slowing or stopped in traffic / V2:Slowing or stopped in traffic / V3:Slowing or stopped in traffic | V1:W / V2:W / V3:W        | V1:(Collision with motor vehicle in traffic) V2:(Collision with motor vehicle in traffic) V3:(Collision with motor vehicle in traffic) | V1:(Light truck(van, mini-van, panel, pickup, sport utility) with only four tires) V2:(Passenger car) V3:(Passenger car)                                  |                   | Dry          | Daylight               | Clear             | NEEDHAM ST                       | Local police  |
| 4088316                                             | 9/5/2015   | Saturday  | 3:36 AM    | NEWTON    | Property damage only                | 0                           | 0                        | Single vehicle            | V1: Travelling straight ahead                                                                           | V1:W                      | V1:(Collision with utility pole)                                                                                                       | V1:(Passenger car)                                                                                                                                        |                   | Dry          | Dark - lighted         | Clear             | NEEDHAM ST                       | Local police  |
| 4100192                                             | 10/9/2015  | Friday    | 12:02 PM   | NEWTON    | Property damage only (none injured) | 0                           | 0                        | Angle                     | V1: Travelling straight ahead / V2:Turning left                                                         | V1:W / V2:S               | V1:(Collision with motor vehicle in traffic) V2:(Collision with motor vehicle in traffic)                                              | V1:(Light truck(van, mini-van, panel, pickup, sport utility) with only four tires) V2:(Light truck(van, mini-van, panel, pickup, sport utility) with only |                   | Dry          | Daylight               | Clear             | NEEDHAM ST / TOWER RD            | Local police  |
| 3152964                                             | 6/15/2012  | Friday    | 12:09 PM   | NEWTON    | Non-fatal injury                    | 1                           | 0                        | Single vehicle            | V1: Turning left                                                                                        | V1:S                      | V1:(Collision with pedestrian)                                                                                                         | V1:(Passenger car)                                                                                                                                        | P1:Skater         | Dry          | Daylight               | Clear/Reporte     | NEEDHAM ST / INDUSTRIAL PL       | Local police  |
| 3407589                                             | 4/23/2013  | Tuesday   | 12:31 PM   | NEWTON    | Property damage only (none injured) | 0                           | 0                        | Rear-end                  | V1: Slowing or stopped in traffic / V2:Travelling straight ahead                                        | V1:8 / V2:8               | V1:(Collision with motor vehicle in traffic) V2:(Collision with motor vehicle in traffic)                                              | V1:(Passenger car) V2:(Light truck(van, mini-van, panel, pickup, sport utility) with only                                                                 |                   | Dry          | Daylight               | Clear/Cloudy      | NEEDHAM STREET                   | Local police  |
| 4115552                                             | 11/6/2015  | Friday    | 11:38 AM   | NEWTON    | Property damage only (none injured) | 0                           | 0                        | Angle                     | V1: Travelling straight ahead / V2:Turning left                                                         | V1:W / V2:N               | V1:(Collision with motor vehicle in traffic) V2:(Collision with motor vehicle in traffic)                                              | V1:(Passenger car) V2:(Passenger car)                                                                                                                     |                   | Dry          | Daylight               | Clear/Clear       | NEEDHAM ST                       | Local police  |
| 11: Needham Street at Jaconnet Street               |            |           |            |           |                                     |                             |                          |                           |                                                                                                         |                           |                                                                                                                                        |                                                                                                                                                           |                   |              |                        |                   |                                  |               |
| 3607859                                             | 10/11/2013 | Friday    | 3:46 PM    | NEWTON    | Property damage only (none injured) | 0                           | 0                        | Single vehicle crash      | V1: Travelling straight ahead                                                                           | V1:E                      | V1:(Collision with other fixed object (wall, building, tunnel, etc.))                                                                  | V1:(Passenger car)                                                                                                                                        |                   | Dry          | Daylight               | Clear             | NEEDHAM ST                       | Local police  |
| 3822670                                             | 5/12/2014  | Monday    | 11:47 AM   | NEWTON    | Non-fatal injury                    | 1                           | 0                        | Single vehicle crash      | V1: Travelling straight ahead                                                                           | V1:E                      | V1:(Collision with light pole or other post/support)                                                                                   | V1:(Passenger car)                                                                                                                                        |                   | Dry          | Daylight               | Clear             | NEEDHAM ST                       | Local police  |
| 3984046                                             | 11/26/2014 | Wednesday | 11:44 AM   | NEWTON    | Property damage only (none injured) | 0                           | 0                        | Rear-end                  | V1: Slowing or stopped in traffic / V2:Travelling straight ahead                                        | V1:E / V2:E               | V1:(Collision with motor vehicle in traffic) V2:(Collision with motor vehicle in traffic)                                              | V1:(Light truck(van, mini-van, panel, pickup, sport utility) with only four tires) V2:(Light truck(van, mini-van, panel, pickup, sport utility) with only |                   | Wet          | Daylight               | Snow              | NEEDHAM ST                       | Local police  |
| 2733524                                             | 6/7/2011   | Tuesday   | 7:08 AM    | NEWTON    | Property damage only (none injured) | 0                           | 0                        | Angle                     | V1: Turning left / V2:Travelling straight ahead                                                         | V1:N / V2:E               | V1:(Collision with motor vehicle in traffic) V2:(Collision with motor vehicle in traffic)                                              | V1:(Unknown heavy truck, cannot classify) V2:(Passenger car)                                                                                              |                   | Dry          | Daylight               | Clear             | JACONNET STREET / NEEDHAM STREET | Local police  |
| 3556758                                             | 7/26/2013  | Friday    | 10:19 PM   | NEWTON    | Not Reported                        | 0                           | 0                        | Sideswipe, same           | V1: Parked / V2:Unknown                                                                                 | V1:W / V2:U               | V1:() V2:(Collision with parked motor vehicle)                                                                                         | V1:(Passenger car) V2:(Unknown vehicle configuration)                                                                                                     |                   | Dry          | Dark - lighted roadway | Clear/Unknown     | NEEDHAM STREET                   | Local police  |
| 2763774                                             | 9/8/2011   | Thursday  | 7:04 PM    | NEWTON    | Property damage only                | 0                           | 0                        | Single vehicle            | V1: Travelling straight ahead                                                                           | V1:N                      | V1:(Other non-collision)                                                                                                               | V1:(Passenger car)                                                                                                                                        |                   | Wet          | Dark -                 | Rain              | NEEDHAM ST                       | Local police  |



| Crash Number                          | Crash Date | Weekday   | Crash Time | City/Town | Crash Severity                      | Number of NonFatal Injuries | Number of Fatal Injuries | Manner of Collision       | Vehicle Action Prior to Crash                                        | Vehicle Travel Directions | Most Harmful Events                                                                                                                | Vehicle Configuration                                                                                 | Non Motorist Type | Road Surface | Ambient Light          | Weather Condition | Roadway        | Police Agency |
|---------------------------------------|------------|-----------|------------|-----------|-------------------------------------|-----------------------------|--------------------------|---------------------------|----------------------------------------------------------------------|---------------------------|------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------|-------------------|--------------|------------------------|-------------------|----------------|---------------|
| 11: Needham Street at Jaconnet Street |            |           |            |           |                                     |                             |                          |                           |                                                                      |                           |                                                                                                                                    |                                                                                                       |                   |              |                        |                   |                |               |
| 2789361                               | 10/23/2011 | Sunday    | 4:51 PM    | NEWTON    | Property damage only (none injured) | 0                           | 0                        | Rear-end                  | V1: Travelling straight ahead / V2:Travelling straight ahead         | V1:W / V2:W               | V1:(Collision with motor vehicle in traffic) V2:(Collision with motor vehicle in traffic)                                          | V1:(Passenger car) V2:(Passenger car)                                                                 |                   | Dry          | Daylight               | Cloudy            | NEEDHAM ST     | Local police  |
| 4011794                               | 2/13/2015  | Friday    | 3:44 PM    | NEWTON    | Non-fatal injury                    | 1                           | 0                        | Rear-end                  | V1: Travelling straight ahead / V2:Travelling straight ahead         | V1:W / V2:W               | V1:(Collision with motor vehicle in traffic) V2:(Collision with motor vehicle in traffic)                                          | V1:(Passenger car) V2:(Light truck(van, mini-van, panel, pickup, sport utility) with only             |                   | Dry          | Daylight               | Clear             | NEEDHAM STREET | Local police  |
| 3974287                               | 11/11/2014 | Tuesday   | 12:05 PM   | NEWTON    | Non-fatal injury                    | 1                           | 0                        | Single vehicle            | V1: Travelling straight ahead                                        | V1:N                      | V1:(Collision with pedestrian)                                                                                                     | V1:(Passenger car)                                                                                    | P2:Pedestrian     | Dry          | Daylight               | Clear             | NEEDHAM ST     | Local police  |
| 12: Needham Street at Rockland Street |            |           |            |           |                                     |                             |                          |                           |                                                                      |                           |                                                                                                                                    |                                                                                                       |                   |              |                        |                   |                |               |
| 2794254                               | 11/10/2011 | Thursday  | 8:57 AM    | NEWTON    | Not Reported                        | 0                           | 0                        | Unknown                   | V1: Parked / V2:Unknown                                              | V1:E / V2:U               | V1:(Collision with motor vehicle in traffic) V2:(Collision with parked motor vehicle)                                              | V1:(Passenger car) V2:()                                                                              |                   | Not reported | Daylight               | Cloudy            | NEEDHAM ST     | Local police  |
| 2801258                               | 11/9/2011  | Wednesday | 6:15 PM    | NEWTON    | Non-fatal injury                    | 1                           | 0                        | Rear-end                  | V1: Travelling straight ahead / V2:Travelling straight ahead         | V1:S / V2:S               | V1:(Collision with motor vehicle in traffic) V2:(Collision with motor vehicle in traffic)                                          | V1:(Passenger car) V2:(Passenger car)                                                                 |                   | Dry          | Dark - lighted roadway | Clear             | NEEDHAM ST     | Local police  |
| 3725750                               | 1/23/2014  | Thursday  | 9:21 AM    | NEWTON    | Non-fatal injury                    | 2                           | 0                        | Angle                     | V1: Travelling straight ahead / V2:Entering traffic lane             | V1:E / V2:N               | V1:(Collision with motor vehicle in traffic) V2:(Collision with motor vehicle in traffic)                                          | V1:(Passenger car) V2:(Passenger car)                                                                 |                   | Dry          | Daylight               | Clear/Clear       | NEEDHAM ST     | Local police  |
| 4045285                               | 5/6/2015   | Wednesday | 9:56 AM    | NEWTON    | Non-fatal injury                    | 1                           | 0                        | Rear-end                  | V1: Slowing or stopped in traffic / V2:Slowing or stopped in traffic | V1:E / V2:E               | V1:(Collision with motor vehicle in traffic) V2:()                                                                                 | V1:(Passenger car) V2:(Light truck(van, mini-van, panel, pickup, sport utility) with only             |                   | Dry          | Daylight               | Clear/Clear       | NEEDHAM ST     | Local police  |
| 4054612                               | 5/19/2015  | Tuesday   | 10:46 AM   | NEWTON    | Property damage only (none injured) | 0                           | 0                        | Angle                     | V1: Turning left / V2:Travelling straight ahead                      | V1:S / V2:E               | V1:(Collision with motor vehicle in traffic) V2:(Collision with motor vehicle in traffic)                                          | V1:(Light truck(van, mini-van, panel, pickup, sport utility) with only four tires) V2:(Passenger car) |                   | Wet          | Daylight               | Rain/Rain         | NEEDHAM ST     | Local police  |
| 4054641                               | 6/2/2015   | Tuesday   | 4:17 PM    | NEWTON    | Property damage only (none injured) | 0                           | 0                        | Rear-end                  | V1: Slowing or stopped in traffic / V2:Backing                       | V1:S / V2:N               | V1:(Collision with motor vehicle in traffic) V2:(Collision with motor vehicle in traffic)                                          | V1:(Passenger car) V2:(Passenger car)                                                                 |                   | Dry          | Daylight               | Clear/Clear       | NEEDHAM ST     | Local police  |
| 3531787                               | 7/16/2013  | Tuesday   | 2:09 PM    | NEWTON    | Property damage only (none injured) | 0                           | 0                        | Angle                     | V1: Travelling straight ahead / V2:Turning left                      | V1:E / V2:N               | V1:(Collision with motor vehicle in traffic) V2:(Collision with motor vehicle in traffic)                                          | V1:(Passenger car) V2:(Passenger car)                                                                 |                   | Dry          | Daylight               | Clear             | NEEDHAM ST     | Local police  |
| 2743823                               | 7/19/2011  | Tuesday   | 1:55 PM    | NEWTON    | Non-fatal injury                    | 2                           | 0                        | Head-on                   | V1: Travelling straight ahead / V2:Travelling straight ahead         | V1:W / V2:E               | V1:(Collision with motor vehicle in traffic) V2:(Collision with motor vehicle in traffic)                                          | V1:(Passenger car) V2:(Passenger car)                                                                 |                   | Dry          | Daylight               | Clear/Clear       | NEEDHAM ST     | Local police  |
| 3346943                               | 1/21/2013  | Monday    | 1:29 PM    | NEWTON    | Non-fatal injury                    | 1                           | 0                        | Head-on                   | V1: Travelling straight ahead                                        | V1:E                      | V1:(Collision with pedestrian)                                                                                                     | V1:(Light truck(van, mini-van, panel, pickup, sport utility) with only four tires)                    | P2:Pedestrian     | Dry          | Daylight               | Cloudy            | NEEDHAM ST     | Local police  |
| 3802824                               | 4/24/2014  | Thursday  | 7:55 PM    | NEWTON    | Not Reported                        | 0                           | 0                        | Angle                     | V1: Parked                                                           | V1:U                      | V1:(Collision with motor vehicle in traffic)                                                                                       | V1:(Passenger car)                                                                                    |                   | Dry          | Daylight               | Clear/Other       | NEEDHAM ST     | Local police  |
| 3118529                               | 5/29/2012  | Tuesday   | 4:27 PM    | NEWTON    | Non-fatal injury                    | 2                           | 0                        | Angle                     | V1: Backing / V2:Travelling straight ahead                           | V1:E / V2:S               | V1:(Collision with motor vehicle in traffic) V2:(Collision with motor vehicle in traffic)                                          | V1:(Light truck(van, mini-van, panel, pickup, sport utility) with only four tires) V2:(Passenger car) |                   | Dry          | Daylight               | Clear             | NEEDHAM ST     | Local police  |
| 3152966                               | 6/17/2012  | Sunday    | 1:18 PM    | NEWTON    | Property damage only (none injured) | 0                           | 0                        | Angle                     | V1: Travelling straight ahead / V2:Backing                           | V1:S / V2:W               | V1:(Collision with motor vehicle in traffic) V2:(Collision with motor vehicle in traffic)                                          | V1:(Passenger car) V2:(Passenger car)                                                                 |                   | Dry          | Daylight               | Clear             | NEEDHAM ST     | Local police  |
| 3377966                               | 3/24/2013  | Sunday    | 1:48 PM    | NEWTON    | Non-fatal injury                    | 2                           | 0                        | Rear-end                  | V1: Travelling straight ahead / V2:Slowing or stopped in traffic     | V1:E / V2:E               | V1:(Collision with motor vehicle in traffic) V2:(Collision with motor vehicle in traffic)                                          | V1:(Passenger car) V2:(Passenger car)                                                                 |                   | Dry          | Daylight               | Clear             | NEEDHAM ST     | Local police  |
| 3872091                               | 7/2/2014   | Wednesday | 10:04 AM   | NEWTON    | Property damage only (none injured) | 0                           | 0                        | Sideswipe, same direction | V1: Travelling straight ahead / V2:Turning right                     | V1:S / V2:S               | V1:(Collision with motor vehicle in traffic) V2:(Collision with motor vehicle in traffic)                                          | V1:(Light truck(van, mini-van, panel, pickup, sport utility) with only four tires) V2:(Passenger car) |                   | Dry          | Daylight               | Clear             | NEEDHAM ST     | Local police  |
| 3876336                               | 4/14/2014  | Monday    | 5:40 PM    | NEWTON    | Non-fatal injury                    | 1                           | 0                        | Angle                     | V1: Turning left                                                     | V1:W                      | V1:(Collision with cyclist (bicycle, tricycle, unicycle, pedal car))                                                               | V1:(Passenger car)                                                                                    |                   | Dry          | Daylight               | Clear/Clear       | NEEDHAM STREET | Local police  |
| 3888528                               | 7/1/2014   | Tuesday   | 9:51 PM    | NEWTON    | Property damage only (none injured) | 0                           | 0                        | Head-on                   | V1: Unknown / V2:Parked / V3:Parked                                  | V1:U / V2:8 / V3:8        | V1:(Collision with parked motor vehicle) V2:(Collision with motor vehicle in traffic) V3:(Collision with motor vehicle in traffic) | V1:(Passenger car) V2:(Passenger car) V3:(Passenger car)                                              |                   | Dry          | Dark - lighted roadway | Clear             | NEEDHAM ST     | Local police  |
| 4111039                               | 11/3/2015  | Tuesday   | 9:36 AM    | NEWTON    | Property damage only (none injured) | 0                           | 0                        | Rear-end                  | V1: Parked / V2:Travelling straight ahead                            | V1:8 / V2:8               | V1:(Collision with motor vehicle in traffic) V2:(Collision with parked motor vehicle)                                              | V1:(Light truck(van, mini-van, panel, pickup, sport utility) with only four tires) V2:(Passenger car) |                   | Dry          | Daylight               | Clear             | NEEDHAM ST     | Local police  |
| 4129838                               | 12/17/2015 | Thursday  | 7:27 PM    | NEWTON    | Property damage only (none injured) | 0                           | 0                        | Angle                     | V1: Entering traffic lane / V2:Travelling straight ahead             | V1:W / V2:N               | V1:(Collision with motor vehicle in traffic) V2:(Collision with motor vehicle in traffic)                                          | V1:(Light truck(van, mini-van, panel, pickup, sport utility) with only four tires) V2:(Passenger car) |                   | Wet          | Dark - lighted roadway | Rain              | NEEDHAM ST     | Local police  |

| Crash Number                                            | Crash Date | Weekday   | Crash Time | City/Town | Crash Severity                      | Number of NonFatal Injuries | Number of Fatal Injuries | Manner of Collision           | Vehicle Action Prior to Crash                                                                           | Vehicle Travel Directions | Most Harmful Events                                                                                                                    | Vehicle Configuration                                                                                                                                     | Non Motorist Type                                   | Road Surface | Ambient Light          | Weather Condition | Roadway                          | Police Agency |
|---------------------------------------------------------|------------|-----------|------------|-----------|-------------------------------------|-----------------------------|--------------------------|-------------------------------|---------------------------------------------------------------------------------------------------------|---------------------------|----------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------|--------------|------------------------|-------------------|----------------------------------|---------------|
| 13: Needham Street at Columbia Avenue / Avalon Driveway |            |           |            |           |                                     |                             |                          |                               |                                                                                                         |                           |                                                                                                                                        |                                                                                                                                                           |                                                     |              |                        |                   |                                  |               |
| 2821418                                                 | 11/10/2011 | Thursday  | 6:33 PM    | NEWTON    | Non-fatal injury                    | 1                           | 0                        | Rear-end                      | V1: Slowing or stopped in traffic / V2:Slowing or stopped in traffic / V3:Slowing or stopped in traffic | V1:N / V2:N / V3:N        | V1:(Collision with motor vehicle in traffic) V2:() V3:(Collision with motor vehicle in traffic)                                        | V1:(Passenger car) V2:(Light truck(van, mini-van, panel, pickup, sport utility) with only four tires) V3:(Light truck(van, mini-van, panel, pickup, sport |                                                     | Wet          | Dark - lighted roadway | Rain/Rain         | NEEDHAM ST                       | Local police  |
| 3385989                                                 | 3/30/2013  | Saturday  | 12:03 PM   | NEWTON    | Non-fatal injury                    | 1                           | 0                        | Rear-end                      | V1: Slowing or stopped in traffic / V2:Travelling straight ahead                                        | V1:W / V2:W               | V1:(Collision with motor vehicle in traffic) V2:(Collision with motor vehicle in traffic)                                              | V1:(Light truck(van, mini-van, panel, pickup, sport utility) with only four tires) V2:(Passenger car)                                                     |                                                     | Dry          | Daylight               | Clear/Clear       | COLUMBIA ROAD / NEEDHAM STREET   | Local police  |
| 3709627                                                 | 12/24/2013 | Tuesday   | 11:15 AM   | NEWTON    | Property damage only (none injured) | 0                           | 0                        | Angle                         | V1: Travelling straight ahead / V2:Parked                                                               | V1:S / V2:E               | V1:(Collision with parked motor vehicle) V2:(Collision with motor vehicle in traffic)                                                  | V1:(Passenger car) V2:(Light truck(van, mini-van, panel, pickup, sport utility) with only                                                                 |                                                     | Wet          | Daylight               | Clear             | NEEDHAM ST                       | Local police  |
| 3711544                                                 | 1/2/2014   | Thursday  | 9:36 AM    | NEWTON    | Property damage only (none injured) | 0                           | 0                        | Sideswipe, opposite direction | V1: Travelling straight ahead / V2:Parked                                                               | V1:E / V2:8               | V1:(Collision with curb) V2:(Collision with motor vehicle in traffic)                                                                  | V1:(Passenger car) V2:(Light truck(van, mini-van, panel, pickup, sport utility) with only                                                                 |                                                     | Snow         | Daylight               | Snow              | NEEDHAM ST                       | Local police  |
| 3924584                                                 | 8/27/2014  | Wednesday | 4:09 PM    | NEWTON    | Property damage only (none injured) | 0                           | 0                        | Rear-end                      | V1: Slowing or stopped in traffic / V2:Slowing or stopped in traffic / V3:Travelling straight ahead     | V1:W / V2:W / V3:W        | V1:(Collision with motor vehicle in traffic) V2:(Collision with motor vehicle in traffic) V3:(Collision with motor vehicle in traffic) | V1:(Passenger car) V2:(Passenger car) V3:(Light truck(van, mini-van, panel, pickup, sport utility) with only four tires)                                  |                                                     | Dry          | Daylight               | Clear             | NEEDHAM ST                       | Local police  |
| 3949685                                                 | 9/11/2014  | Thursday  | 8:59 PM    | NEWTON    | Non-fatal injury                    | 1                           | 0                        | Single vehicle crash          | V1: Turning right                                                                                       | V1:S                      | V1:(Collision with cyclist (bicycle, tricycle, unicycle, pedal car))                                                                   | V1:(Passenger car)                                                                                                                                        | P1:Pedalcyclist (bicycle, tricycle, unicycle, pedal | Dry          | Dark - lighted roadway | Clear             | NEEDHAM ST                       | Local police  |
| 3953307                                                 | 9/10/2014  | Wednesday | 8:01 AM    | NEWTON    | Property damage only (none injured) | 0                           | 0                        | Sideswipe, same direction     | V1: Turning left / V2:Overtaking/passing                                                                | V1:S / V2:S               | V1:(Collision with motor vehicle in traffic) V2:(Collision with motor vehicle in traffic)                                              | V1:(Bus (seats for more than 15 people, including driver)) V2:(Passenger car)                                                                             |                                                     | Dry          | Daylight               | Cloudy            | NEEDHAM STREET                   | Local police  |
| 4055900                                                 | 6/25/2015  | Thursday  | 9:18 AM    | NEWTON    | Property damage only (none injured) | 0                           | 0                        | Angle                         | V1: Backing / V2:Travelling straight ahead                                                              | V1:N / V2:E               | V1:(Collision with motor vehicle in traffic) V2:(Collision with motor vehicle in traffic)                                              | V1:(Passenger car) V2:(Passenger car)                                                                                                                     |                                                     | Dry          | Daylight               | Clear             | NEEDHAM ST                       | Local police  |
| 4055916                                                 | 6/20/2015  | Saturday  | 4:57 PM    | NEWTON    | Property damage only (none injured) | 0                           | 0                        | Rear-end                      | V1: Travelling straight ahead / V2:Travelling straight ahead                                            | V1:N / V2:N               | V1:(Collision with motor vehicle in traffic) V2:(Collision with motor vehicle in traffic)                                              | V1:(Passenger car) V2:(Light truck(van, mini-van, panel, pickup, sport utility) with only                                                                 |                                                     | Dry          | Daylight               | Clear             | NEEDHAM ST                       | Local police  |
| 2898017                                                 | 1/23/2012  | Monday    | 12:04 PM   | NEWTON    | Non-fatal injury                    | 1                           | 0                        | Angle                         | V1: Turning left / V2:Travelling straight ahead                                                         | V1:W / V2:N               | V1:(Collision with motor vehicle in traffic) V2:(Collision with motor vehicle in traffic)                                              | V1:(Passenger car) V2:(Passenger car)                                                                                                                     |                                                     | Dry          | Daylight               | Cloudy/Cloudy     | NEEDHAM ST                       | Local police  |
| 3288911                                                 | 10/31/2012 | Wednesday | 1:54 PM    | NEWTON    | Non-fatal injury                    | 1                           | 0                        | Angle                         | V1: Entering traffic lane / V2:Overtaking/passing                                                       | V1:N / V2:E               | V1:(Collision with motor vehicle in traffic) V2:(Collision with motor vehicle in traffic)                                              | V1:(Passenger car) V2:(Light truck(van, mini-van, panel, pickup, sport utility) with only                                                                 |                                                     | Dry          | Daylight               | Cloudy            | NEEDHAM ST                       | Local police  |
| 3309566                                                 | 12/11/2012 | Tuesday   | 3:12 PM    | NEWTON    | Non-fatal injury                    | 1                           | 0                        | Rear-end                      | V1: Backing                                                                                             | V1:8                      | V1:(Collision with pedestrian)                                                                                                         | V1:(Passenger car)                                                                                                                                        | P2:Pedestrian                                       | Dry          | Daylight               | Clear/Clear       | NEEDHAM ST                       | Local police  |
| 3479268                                                 | 6/17/2013  | Monday    | 5:02 PM    | NEWTON    | Property damage only (none injured) | 0                           | 0                        | Sideswipe, same               | V1: Travelling straight ahead                                                                           | V1:E                      | V1:(Collision with motor vehicle in traffic)                                                                                           | V1:(Passenger car)                                                                                                                                        |                                                     | Dry          | Daylight               | Clear             | NEEDHAM ST                       | Local police  |
| 3479269                                                 | 6/17/2013  | Monday    | 7:36 PM    | NEWTON    | Non-fatal injury                    | 1                           | 0                        | Angle                         | V1: Travelling straight ahead / V2:Turning left                                                         | V1:S / V2:S               | V1:(Collision with motor vehicle in traffic) V2:(Collision with motor vehicle in traffic)                                              | V1:(Motorcycle) V2:(Passenger car)                                                                                                                        |                                                     | Wet          | Dawn                   | Rain/Cloudy       | NEEDHAM ST                       | Local police  |
| 3479272                                                 | 6/18/2013  | Tuesday   | 4:45 PM    | NEWTON    | Property damage only (none injured) | 0                           | 0                        | Angle                         | V1: Slowing or stopped in traffic / V2:Backing                                                          | V1:6 / V2:6               | V1:() V2:(Collision with motor vehicle in traffic)                                                                                     | V1:(Passenger car) V2:(Light truck(van, mini-van, panel, pickup, sport utility) with only                                                                 |                                                     | Wet          | Daylight               | Rain              | NEEDHAM ST                       | Local police  |
| 3735895                                                 | 2/7/2014   | Friday    | 12:36 PM   | NEWTON    | Not Reported                        | 0                           | 0                        | Unknown                       | V1: Parked / V2:Unknown                                                                                 | V1:W / V2:U               | V1:(Collision with motor vehicle in traffic) V2:(Collision with parked motor vehicle)                                                  | V1:(Light truck(van, mini-van, panel, pickup, sport utility) with only four tires) V2:()                                                                  |                                                     | Wet          | Daylight               | Clear             | NEEDHAM ST                       | Local police  |
| 3965326                                                 | 10/21/2014 | Tuesday   | 4:55 PM    | NEWTON    | Property damage only (none injured) | 0                           | 0                        | Rear-to-rear                  | V1: Parked                                                                                              | V1:6                      | V1:(Collision with motor vehicle in traffic)                                                                                           | V1:(Passenger car)                                                                                                                                        |                                                     | Dry          | Daylight               | Cloudy            | NEEDHAM ST                       | Local police  |
| 3981600                                                 | 12/3/2014  | Wednesday | 3:35 PM    | NEWTON    | Non-fatal injury                    | 1                           | 0                        | Rear-end                      | V1: Slowing or stopped in traffic / V2:Slowing or stopped in traffic                                    | V1:E / V2:E               | V1:(Collision with motor vehicle in traffic) V2:(Collision with motor vehicle in traffic)                                              | V1:(Passenger car) V2:(Passenger car)                                                                                                                     |                                                     | Wet          | Dusk                   | Rain              | NEEDHAM ST                       | Local police  |
| 3986059                                                 | 11/28/2014 | Friday    | 6:01 AM    | NEWTON    | Non-fatal injury                    | 1                           | 0                        | Single vehicle crash          | V1: Travelling straight ahead                                                                           | V1:S                      | V1:(Collision with tree)                                                                                                               | V1:(Passenger car)                                                                                                                                        |                                                     | Wet          | Dark - lighted         | Snow              | NEEDHAM ST                       | Local police  |
| 2723228                                                 | 5/10/2011  | Tuesday   | 7:49 AM    | NEWTON    | Not Reported                        | 0                           | 0                        | Single vehicle crash          | V1: Unknown                                                                                             | V1:U                      | V1:(Collision with light pole or other post/support)                                                                                   | V1:(Unknown vehicle configuration)                                                                                                                        |                                                     | Unknown      | Unknown                | Unknown           | NEEDHAM ST                       | Local police  |
| 2731328                                                 | 5/31/2011  | Tuesday   | 1:47 PM    | NEWTON    | Property damage only (none injured) | 0                           | 0                        | Angle                         | V1: Travelling straight ahead / V2:Travelling straight ahead                                            | V1:W / V2:W               | V1:(Collision with motor vehicle in traffic) V2:(Collision with motor vehicle in traffic)                                              | V1:(Light truck(van, mini-van, panel, pickup, sport utility) with only four tires) V2:(Passenger car)                                                     |                                                     | Dry          | Daylight               | Clear/Clear       | NEEDHAM ST                       | Local police  |
| 2741834                                                 | 7/12/2011  | Tuesday   | 4:15 PM    | NEWTON    | Non-fatal injury                    | 1                           | 0                        | Rear-end                      | V1: Slowing or stopped in traffic / V2:Slowing or stopped in traffic                                    | V1:E / V2:E               | V1:(Collision with motor vehicle in traffic) V2:(Collision with motor vehicle in traffic)                                              | V1:(Passenger car) V2:(Passenger car)                                                                                                                     |                                                     | Dry          | Daylight               | Clear/Clear       | COLUMBIA AVENUE / NEEDHAM STREET | Local police  |

| Crash Number                                            | Crash Date | Weekday   | Crash Time | City/Town | Crash Severity                      | Number of NonFatal Injuries | Number of Fatal Injuries | Manner of Collision       | Vehicle Action Prior to Crash                                                                       | Vehicle Travel Directions | Most Harmful Events                                                                                                                    | Vehicle Configuration                                                                                                                                     | Non Motorist Type                                   | Road Surface | Ambient Light          | Weather Condition | Roadway                            | Police Agency |
|---------------------------------------------------------|------------|-----------|------------|-----------|-------------------------------------|-----------------------------|--------------------------|---------------------------|-----------------------------------------------------------------------------------------------------|---------------------------|----------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------|--------------|------------------------|-------------------|------------------------------------|---------------|
| 13: Needham Street at Columbia Avenue / Avalon Driveway |            |           |            |           |                                     |                             |                          |                           |                                                                                                     |                           |                                                                                                                                        |                                                                                                                                                           |                                                     |              |                        |                   |                                    |               |
| 3323845                                                 | 12/21/2012 | Friday    | 1:45 PM    | NEWTON    | Property damage only (none injured) | 0                           | 0                        | Rear-end                  | V1: Slowing or stopped in traffic / V2:Travelling straight ahead                                    | V1:W / V2:W               | V1:(Collision with motor vehicle in traffic) V2:(Collision with motor vehicle in traffic)                                              | V1:(Light truck(van, mini-van, panel, pickup, sport utility) with only four tires) V2:(Passenger car)                                                     |                                                     | Wet          | Daylight               | Rain              | NEEDHAM ST                         | Local police  |
| 3790059                                                 | 4/3/2014   | Thursday  | 8:55 AM    | NEWTON    | Property damage only (none injured) | 0                           | 0                        | Single vehicle crash      | V1: Travelling straight ahead                                                                       | V1:E                      | V1:(Collision with light pole or other post/support)                                                                                   | V1:(Light truck(van, mini-van, panel, pickup, sport utility) with only four tires)                                                                        |                                                     | Dry          | Dark - lighted roadway | Clear             | NEEDHAM ST                         | Local police  |
| 3792042                                                 | 4/7/2014   | Monday    | 3:49 PM    | NEWTON    | Non-fatal injury                    | 1                           | 0                        | Rear-end                  | V1: Slowing or stopped in traffic / V2:Slowing or stopped in traffic                                | V1:W / V2:W               | V1:(Collision with motor vehicle in traffic) V2:(Collision with motor vehicle in traffic)                                              | V1:(Passenger car) V2:(Light truck(van, mini-van, panel, pickup, sport utility) with only                                                                 |                                                     | Dry          | Daylight               | Cloudy            | COLUMBIA AVE / NEEDHAM ST          | Local police  |
| 3822668                                                 | 5/7/2014   | Wednesday | 9:38 AM    | NEWTON    | Non-fatal injury                    | 1                           | 0                        | Single vehicle crash      | V1: Turning right                                                                                   | V1:W                      | V1:(Collision with pedestrian)                                                                                                         | V1:(Passenger car)                                                                                                                                        | P2:Pedestrian                                       | Dry          | Daylight               | Clear             | NEEDHAM ST                         | Local police  |
| 4004736                                                 | 1/30/2015  | Friday    | 3:46 PM    | NEWTON    | Property damage only (none injured) | 0                           | 0                        | Sideswipe, same direction | V1: Slowing or stopped in traffic / V2:Turning right                                                | V1:S / V2:S               | V1:(Collision with motor vehicle in traffic) V2:(Collision with motor vehicle in traffic)                                              | V1:(Passenger car) V2:(Bus (seats for more than 15 people, including driver))                                                                             |                                                     | Dry          | Daylight               | Clear             | NEEDHAM ST                         | Local police  |
| 4011993                                                 | 2/13/2015  | Friday    | 4:58 PM    | NEWTON    | Property damage only (none injured) | 0                           | 0                        | Angle                     | V1: Backing / V2:Slowing or stopped in traffic                                                      | V1:S / V2:E               | V1:(Collision with motor vehicle in traffic) V2:(Collision with motor vehicle in traffic)                                              | V1:(Truck/trailer) V2:(Passenger car)                                                                                                                     |                                                     | Dry          | Dusk                   | Clear             | NEEDHAM STREET                     | Local police  |
| 2757619                                                 | 8/18/2011  | Thursday  | 9:07 PM    | NEWTON    | Not Reported                        | 0                           | 0                        | Rear-end                  | V1: Backing / V2:Parked                                                                             | V1:S / V2:S               | V1:(Collision with parked motor vehicle) V2:()                                                                                         | V1:(Light truck(van, mini-van, panel, pickup, sport utility) with only four tires) V2:(Passenger car)                                                     |                                                     | Dry          | Dark - lighted roadway | Clear             | NEEDHAM ST                         | Local police  |
| 2760346                                                 | 8/22/2011  | Monday    | 1:37 PM    | NEWTON    | Not Reported                        | 0                           | 0                        | Sideswipe, same           | V1: Parked                                                                                          | V1:8                      | V1:(Collision with parked motor vehicle)                                                                                               | V1:(Passenger car)                                                                                                                                        |                                                     | Dry          | Daylight               | Clear             | NEEDHAM ST                         | Local police  |
| 3611216                                                 | 10/18/2013 | Friday    | 1:55 PM    | NEWTON    | Property damage only (none injured) | 0                           | 0                        | Rear-end                  | V1: Slowing or stopped in traffic / V2:Slowing or stopped in traffic / V3:Travelling straight ahead | V1:E / V2:E / V3:E        | V1:(Collision with motor vehicle in traffic) V2:(Collision with motor vehicle in traffic) V3:(Collision with motor vehicle in traffic) | V1:(Light truck(van, mini-van, panel, pickup, sport utility) with only four tires) V2:(Light truck(van, mini-van, panel, pickup, sport utility) with only |                                                     | Dry          | Daylight               | Clear             | NEEDHAM ST                         | Local police  |
| 3654807                                                 | 10/29/2013 | Tuesday   | 6:04 PM    | NEWTON    | Non-fatal injury                    | 1                           | 0                        | Single vehicle crash      | V1: Turning left                                                                                    | V1:E                      | V1:(Collision with cyclist (bicycle, tricycle, unicycle, pedal car))                                                                   | V1:(Passenger car)                                                                                                                                        | P2:Pedalcyclist (bicycle, tricycle, unicycle, pedal | Dry          | Dark - lighted roadway | Clear             | NEEDHAM ST                         | Local police  |
| 3888408                                                 | 7/5/2014   | Saturday  | 12:51 AM   | NEWTON    | Property damage only (none injured) | 0                           | 0                        | Rear-to-rear              | V1: Parked                                                                                          | V1:6                      | V1:(Collision with motor vehicle in traffic)                                                                                           | V1:(Passenger car)                                                                                                                                        |                                                     | Wet          | Other                  | Rain              | NEEDHAM ST                         | Local police  |
| 14: Winchester Street at Needham Street / Dedham Street |            |           |            |           |                                     |                             |                          |                           |                                                                                                     |                           |                                                                                                                                        |                                                                                                                                                           |                                                     |              |                        |                   |                                    |               |
| 3248151                                                 | 8/21/2012  | Tuesday   | 5:50 AM    | NEWTON    | Non-fatal injury                    | 1                           | 0                        | Angle                     | V1: Turning left                                                                                    | V1:S                      | V1:(Collision with cyclist (bicycle, tricycle, unicycle, pedal car))                                                                   | V1:(Passenger car)                                                                                                                                        | P3:Pedalcyclist (bicycle, tricycle, unicycle, pedal | Dry          | Dawn                   | Cloudy            | NEEDHAM STREET                     | Local police  |
| 3265607                                                 | 9/9/2012   | Sunday    | 4:49 PM    | NEWTON    | Property damage only (none injured) | 0                           | 0                        | Single vehicle crash      | V1: Turning right                                                                                   | V1:S                      | V1:(Collision with light pole or other post/support)                                                                                   | V1:(Tractor/semi-trailer)                                                                                                                                 |                                                     | Dry          | Daylight               | Clear             | NEEDHAM STREET / WINCHESTER STREET | Local police  |
| 3407596                                                 | 4/27/2013  | Saturday  | 2:30 PM    | NEWTON    | Not Reported                        | 0                           | 0                        | Angle                     | V1: Travelling straight ahead / V2:Backing                                                          | V1:N / V2:W               | V1:() V2:(Collision with motor vehicle in traffic)                                                                                     | V1:(Passenger car) V2:(Passenger car)                                                                                                                     |                                                     | Dry          | Daylight               | Clear             | NEEDHAM ST                         | Local police  |
| 3423129                                                 | 5/6/2013   | Monday    | 5:52 PM    | NEWTON    | Property damage only (none injured) | 0                           | 0                        | Single vehicle crash      | V1: Turning right                                                                                   | V1:S                      | V1:(Collision with light pole or other post/support)                                                                                   | V1:(Tractor/semi-trailer)                                                                                                                                 |                                                     | Dry          | Daylight               | Clear             | DEDHAM STREET / WINCHESTER STREET  | Local police  |
| 3689019                                                 | 12/12/2013 | Thursday  | 1:30 PM    | NEWTON    | Property damage only (none injured) | 0                           | 0                        | Sideswipe, same direction | V1: Travelling straight ahead / V2:Travelling straight ahead                                        | V1:S / V2:S               | V1:(Collision with motor vehicle in traffic) V2:(Collision with motor vehicle in traffic)                                              | V1:(Passenger car) V2:(Passenger car)                                                                                                                     |                                                     | Dry          | Daylight               | Clear             | WINCHESTER ST                      | Local police  |
| 3731814                                                 | 1/31/2014  | Friday    | 10:27 PM   | NEWTON    | Property damage only (none injured) | 0                           | 0                        | Rear-to-rear              | V1: Parked                                                                                          | V1:U                      | V1:(Collision with motor vehicle in traffic)                                                                                           | V1:(Passenger car)                                                                                                                                        |                                                     | Dry          | Dark - lighted roadway | Clear             | WINCHESTER ST                      | Local police  |
| 3919815                                                 | 8/20/2014  | Wednesday | 12:53 PM   | NEWTON    | Property damage only (none injured) | 0                           | 0                        | Angle                     | V1: Travelling straight ahead / V2:Turning left                                                     | V1:E / V2:N               | V1:(Collision with motor vehicle in traffic) V2:(Collision with motor vehicle in traffic)                                              | V1:(Passenger car) V2:(Light truck(van, mini-van, panel, pickup, sport utility) with only                                                                 |                                                     | Dry          | Daylight               | Clear/Clear       | NEEDHAM ST                         | Local police  |
| 3949618                                                 | 9/6/2014   | Saturday  | 12:41 PM   | NEWTON    | Property damage only (none injured) | 0                           | 0                        | Rear-end                  | V1: Travelling straight ahead / V2:Making U-turn                                                    | V1:S / V2:S               | V1:(Collision with motor vehicle in traffic) V2:(Collision with motor vehicle in traffic)                                              | V1:(Passenger car) V2:(Light truck(van, mini-van, panel, pickup, sport utility) with only                                                                 |                                                     | Dry          | Daylight               | Clear             | NEEDHAM ST / WINCHESTER ST         | Local police  |
| 2727024                                                 | 5/22/2011  | Sunday    | 12:35 PM   | NEWTON    | Not Reported                        | 0                           | 0                        | Unknown                   | V1: Parked                                                                                          |                           | V1:(Collision with unknown movable object)                                                                                             | V1:(Passenger car)                                                                                                                                        |                                                     | Dry          | Daylight               | Clear             | NEEDHAM ST                         | Local police  |
| 2743814                                                 | 7/11/2011  | Monday    | 5:05 PM    | NEWTON    | Property damage only (none injured) | 0                           | 0                        | Not reported              | V1: Travelling straight ahead / V2:Travelling straight ahead                                        | V1:N / V2:N               | V1:(Collision with other movable object) V2:(Collision with other movable object)                                                      | V1:(Light truck(van, mini-van, panel, pickup, sport utility) with only four tires) V2:(Light truck(van, mini-van, panel, pickup, sport utility) with only |                                                     | Not reported | Not reported           | Not Reported      | WINCHESTER ST                      | Local police  |

| Crash Number                                            | Crash Date | Weekday   | Crash Time | City/Town | Crash Severity                      | Number of NonFatal Injuries | Number of Fatal Injuries | Manner of Collision           | Vehicle Action Prior to Crash                                        | Vehicle Travel Directions | Most Harmful Events                                                                       | Vehicle Configuration                                                                                                                                     | Non Motorist Type                                   | Road Surface | Ambient Light          | Weather Condition | Roadway                                | Police Agency |
|---------------------------------------------------------|------------|-----------|------------|-----------|-------------------------------------|-----------------------------|--------------------------|-------------------------------|----------------------------------------------------------------------|---------------------------|-------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------|--------------|------------------------|-------------------|----------------------------------------|---------------|
| 14: Winchester Street at Needham Street / Dedham Street |            |           |            |           |                                     |                             |                          |                               |                                                                      |                           |                                                                                           |                                                                                                                                                           |                                                     |              |                        |                   |                                        |               |
| 3974293                                                 | 11/13/2014 | Thursday  | 9:16 AM    | NEWTON    | Property damage only (none injured) | 0                           | 0                        | Rear-end                      | V1: Slowing or stopped in traffic / V2:Travelling straight ahead     | V1:W / V2:W               | V1:(Collision with motor vehicle in traffic) V2:(Collision with motor vehicle in traffic) | V1:(Light truck(van, mini-van, panel, pickup, sport utility) with only four tires) V2:(Light truck(van, mini-van, panel, pickup, sport utility) with only |                                                     | Dry          | Daylight               | Clear             | NEEDHAM ST                             | Local police  |
| 3976813                                                 | 11/10/2014 | Monday    | 4:17 PM    | NEWTON    | Non-fatal injury                    | 2                           | 0                        | Rear-end                      | V1: Slowing or stopped in traffic / V2:Slowing or stopped in traffic | V1:E / V2:E               | V1:(Collision with motor vehicle in traffic) V2:(Collision with motor vehicle in traffic) | V1:(Passenger car) V2:(Passenger car)                                                                                                                     |                                                     | Dry          | Dusk                   | Clear             | NEEDHAM ST / WINCHESTER ST             | Local police  |
| 3976814                                                 | 11/10/2014 | Monday    | 4:25 PM    | NEWTON    | Property damage only (none injured) | 0                           | 0                        | Rear-to-rear                  | V1: Parked / V2:Backing                                              | V1:S / V2:S               | V1:(Other) V2:(Collision with parked motor vehicle)                                       | V1:(Passenger car) V2:(Light truck(van, mini-van, panel, pickup, sport utility) with only                                                                 |                                                     | Dry          | Dusk                   | Clear             | WINCHESTER ST                          | Local police  |
| 3986053                                                 | 12/15/2014 | Monday    | 3:16 AM    | NEWTON    | Non-fatal injury                    | 1                           | 0                        | Single vehicle                | V1: Turning left                                                     | V1:N                      | V1:(Collision with utility pole)                                                          | V1:(Passenger car)                                                                                                                                        |                                                     | Dry          | Dark - lighted         | Clear             | WINCHESTER ST                          | Local police  |
| 2680861                                                 | 1/10/2011  | Monday    | 11:34 AM   | NEWTON    | Property damage only (none injured) | 0                           | 0                        | Rear-end                      | V1: Slowing or stopped in traffic / V2:Travelling straight ahead     | V1:E / V2:E               | V1:(Collision with motor vehicle in traffic) V2:(Collision with motor vehicle in traffic) | V1:(Tractor/semi-trailer) V2:(Passenger car)                                                                                                              |                                                     | Dry          | Daylight               | Clear             | NEEDHAM STREET                         | Local police  |
| 2689693                                                 | 1/21/2011  | Friday    | 10:40 AM   | NEWTON    | Property damage only (none injured) | 0                           | 0                        | Rear-end                      | V1: Slowing or stopped in traffic / V2:Travelling straight ahead     | V1:E / V2:E               | V1:(Collision with motor vehicle in traffic) V2:(Collision with motor vehicle in traffic) | V1:(Passenger car) V2:(Passenger car)                                                                                                                     |                                                     | Snow         | Daylight               | Snow              | NEEDHAM STREET                         | Local police  |
| 2699891                                                 | 3/1/2011   | Tuesday   | 6:18 AM    | NEWTON    | Property damage only (none injured) | 0                           | 0                        | Single vehicle crash          | V1: Entering traffic lane                                            | V1:W                      | V1:(Collision with light pole or other post/support)                                      | V1:(Light truck(van, mini-van, panel, pickup, sport utility) with only four tires)                                                                        |                                                     | Ice          | Daylight               | Clear             | NEEDHAM ST                             | Local police  |
| 3027471                                                 | 3/30/2012  | Friday    | 7:00 PM    | NEWTON    | Not Reported                        | 0                           | 0                        | Sideswipe, opposite direction | V1: Parked                                                           | V1:8                      | V1:(Collision with motor vehicle in traffic)                                              | V1:(Light truck(van, mini-van, panel, pickup, sport utility) with only four tires)                                                                        |                                                     | Dry          | Dusk                   | Clear             | WINCHESTER ST                          | Local police  |
| 3052324                                                 | 4/18/2012  | Wednesday | 12:52 PM   | NEWTON    | Non-fatal injury                    | 1                           | 0                        | Rear-end                      | V1: Slowing or stopped in traffic / V2:Travelling straight ahead     | V1:W / V2:W               | V1:(Collision with motor vehicle in traffic) V2:(Collision with motor vehicle in traffic) | V1:(Passenger car) V2:(Passenger car)                                                                                                                     |                                                     | Dry          | Daylight               | Clear             | EASY ST / NEEDHAM ST                   | Local police  |
| 3347097                                                 | 1/19/2013  | Saturday  | 10:44 AM   | NEWTON    | Property damage only (none injured) | 0                           | 0                        | Rear-end                      | V1: Slowing or stopped in traffic / V2:Travelling straight ahead     | V1:E / V2:E               | V1:(Collision with motor vehicle in traffic) V2:(Collision with motor vehicle in traffic) | V1:(Light truck(van, mini-van, panel, pickup, sport utility) with only four tires) V2:(Light truck(van, mini-van, panel, pickup, sport utility) with only |                                                     | Dry          | Daylight               | Clear/Clear       | WINCHESTER ST                          | Local police  |
| 3588738                                                 | 8/25/2013  | Sunday    | 3:20 PM    | NEWTON    | Non-fatal injury                    | 1                           | 0                        | Angle                         | V1: Travelling straight ahead                                        | V1:W                      | V1:(Collision with cyclist (bicycle, tricycle, unicycle, pedal car))                      | V1:(Light truck(van, mini-van, panel, pickup, sport utility) with only four tires)                                                                        | P3:Pedalcyclist (bicycle, tricycle, unicycle, pedal | Dry          | Daylight               | Clear             | DEDHAM ST / WINCHESTER ST              | Local police  |
| 3603892                                                 | 9/12/2013  | Thursday  | 3:59 PM    | NEWTON    | Property damage only (none injured) | 0                           | 0                        | Rear-end                      | V1: Travelling straight ahead / V2:Travelling straight ahead         | V1:W / V2:W               | V1:(Collision with motor vehicle in traffic) V2:(Collision with motor vehicle in traffic) | V1:(Passenger car) V2:(Light truck(van, mini-van, panel, pickup, sport utility) with only                                                                 |                                                     | Dry          | Daylight               | Clear             | NEEDHAM ST                             | Local police  |
| 3955530                                                 | 9/30/2014  | Tuesday   | 8:00 PM    | NEWTON    | Property damage only (none injured) | 0                           | 0                        | Sideswipe, same direction     | V1: Travelling straight ahead / V2:Travelling straight ahead         | V1:E / V2:E               | V1:(Collision with motor vehicle in traffic) V2:(Collision with motor vehicle in traffic) | V1:(Passenger car) V2:(Passenger car)                                                                                                                     |                                                     | Wet          | Dark - lighted roadway | Cloudy/Rain       | NEEDHAM ST / WINCHESTER ST             | Local police  |
| 3955607                                                 | 9/30/2014  | Tuesday   | 12:07 PM   | NEWTON    | Non-fatal injury                    | 1                           | 0                        | Single vehicle crash          | V1: Travelling straight ahead / V2:Parked                            | V1:E / V2:E               | V1:(Collision with pedestrian) V2:(Other non-collision)                                   | V1:(Passenger car) V2:(Light truck(van, mini-van, panel, pickup, sport utility) with only four tires)                                                     | P1:Other non-motorist (wheelchair, etc.) /          | Wet          | Daylight               | Rain              | NEEDHAM STREET / WINCHESTER STREET     | Local police  |
| 4042810                                                 | 5/14/2015  | Thursday  | 4:06 PM    | NEWTON    | Property damage only (none injured) | 0                           | 0                        | Sideswipe, same direction     | V1: Turning right / V2:Turning right                                 | V1:N / V2:N               | V1:(Collision with motor vehicle in traffic) V2:(Collision with motor vehicle in traffic) | V1:(Passenger car) V2:(Unknown heavy truck, cannot classify)                                                                                              |                                                     | Dry          | Daylight               | Cloudy            | DEDHAM STREET / WINCHESTER STREET      | Local police  |
| 4054610                                                 | 5/18/2015  | Monday    | 1:06 PM    | NEWTON    | Property damage only (none injured) | 0                           | 0                        | Rear-end                      | V1: Turning right / V2:Turning right                                 | V1:S / V2:S               | V1:(Collision with motor vehicle in traffic) V2:(Collision with motor vehicle in traffic) | V1:(Passenger car) V2:(Light truck(van, mini-van, panel, pickup, sport utility) with only                                                                 |                                                     | Dry          | Daylight               | Clear/Clear       | NEEDHAM ST / WINCHESTER ST             | Local police  |
| 4054614                                                 | 5/20/2015  | Wednesday | 3:57 PM    | NEWTON    | Non-fatal injury                    | 1                           | 0                        | Angle                         | V1: Turning right / V2:Overtaking/passing                            | V1:W / V2:W               | V1:(Collision with motor vehicle in traffic) V2:(Collision with motor vehicle in traffic) | V1:(Light truck(van, mini-van, panel, pickup, sport utility) with only four tires) V2:(MOPED)                                                             |                                                     | Dry          | Daylight               | Clear             | NEEDHAM ST                             | Local police  |
| 3794088                                                 | 4/16/2014  | Wednesday | 8:10 PM    | NEWTON    | Non-fatal injury                    | 2                           | 0                        | Angle                         | V1: Turning left / V2:Travelling straight ahead                      | V1:W / V2:S               | V1:(Collision with motor vehicle in traffic) V2:(Collision with motor vehicle in traffic) | V1:(Passenger car) V2:(Passenger car)                                                                                                                     |                                                     | Dry          | Dark - lighted roadway | Clear             | NEEDHAM ST / WINCHESTER ST / CENTER ST | Local police  |
| 3993319                                                 | 1/5/2015   | Monday    | 9:54 AM    | NEWTON    | Property damage only (none injured) | 0                           | 0                        | Angle                         | V1: Turning left / V2:Travelling straight ahead                      | V1:W / V2:N               | V1:(Collision with motor vehicle in traffic) V2:(Collision with motor vehicle in traffic) | V1:(Light truck(van, mini-van, panel, pickup, sport utility) with only four tires) V2:(Passenger car)                                                     |                                                     | Dry          | Daylight               | Clear             | DEDHAM ST / WINCHESTER ST              | Local police  |
| 2780208                                                 | 8/30/2011  | Tuesday   | 10:02 PM   | NEWTON    | Property damage only (none injured) | 0                           | 0                        | Sideswipe, same               | V1: Turning left                                                     | V1:E                      | V1:(Collision with motor vehicle in traffic)                                              | V1:(Passenger car)                                                                                                                                        |                                                     | Dry          | Dark - lighted roadway | Clear             | NEEDHAM ST / WINCHESTER ST             | Local police  |



| Crash Number                                            | Crash Date | Weekday   | Crash Time | City/Town | Crash Severity                      | Number of NonFatal Injuries | Number of Fatal Injuries | Manner of Collision       | Vehicle Action Prior to Crash                                                                           | Vehicle Travel Directions | Most Harmful Events                                                                                                                    | Vehicle Configuration                                                                                                                                                   | Non Motorist Type | Road Surface | Ambient Light          | Weather Condition | Roadway                                                        | Police Agency |
|---------------------------------------------------------|------------|-----------|------------|-----------|-------------------------------------|-----------------------------|--------------------------|---------------------------|---------------------------------------------------------------------------------------------------------|---------------------------|----------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------|--------------|------------------------|-------------------|----------------------------------------------------------------|---------------|
| 14: Winchester Street at Needham Street / Dedham Street |            |           |            |           |                                     |                             |                          |                           |                                                                                                         |                           |                                                                                                                                        |                                                                                                                                                                         |                   |              |                        |                   |                                                                |               |
| 2782515                                                 | 10/6/2011  | Thursday  | 11:13 AM   | NEWTON    | Property damage only (none injured) | 0                           | 0                        | Angle                     | V1: Slowing or stopped in traffic / V2:Backing                                                          | V1:S / V2:N               | V1:(Collision with motor vehicle in traffic) V2:(Collision with motor vehicle in traffic)                                              | V1:(Passenger car) V2:(Passenger car)                                                                                                                                   |                   | Dry          | Daylight               | Clear             | WINCHESTER ST                                                  | Local police  |
| 3114586                                                 | 5/2/2012   | Wednesday | 3:22 PM    | NEWTON    | Property damage only (none injured) | 0                           | 0                        | Sideswipe, same direction | V1: Travelling straight ahead / V2:Travelling straight ahead                                            | V1:N / V2:N               | V1:(Collision with motor vehicle in traffic) V2:(Collision with motor vehicle in traffic)                                              | V1:(Tractor/semi-trailer) V2:(Light truck(van, mini-van, panel, pickup, sport utility) with only                                                                        |                   | Dry          | Daylight               | Cloudy            | NEEDHAM STREET / WINCHESTER STREET / DEDHAM STREET             | Local police  |
| 3654799                                                 | 9/14/2013  | Saturday  | 3:22 PM    | NEWTON    | Unknown                             | 0                           | 0                        | Angle                     | V1: Backing / V2:Parked                                                                                 | V1:S / V2:N               | V1:() V2:(Collision with motor vehicle in traffic)                                                                                     | V1:(Passenger car) V2:(Passenger car)                                                                                                                                   |                   | Dry          | Daylight               | Clear/Clear       | NEEDHAM ST                                                     | Local police  |
| 3871862                                                 | 6/30/2014  | Monday    | 3:17 PM    | NEWTON    | Property damage only                | 0                           | 0                        | Single vehicle            | V1: Travelling straight ahead                                                                           | V1:W                      | V1:(Overturn/rollover)                                                                                                                 | V1:(Passenger car)                                                                                                                                                      |                   | Dry          | Daylight               | Clear/Clear       | NEEDHAM ST                                                     | Local police  |
| 3898641                                                 | 7/17/2014  | Thursday  | 12:34 PM   | NEWTON    | Property damage only (none injured) | 0                           | 0                        | Angle                     | V1: Turning left / V2:Entering traffic lane                                                             | V1:E / V2:S               | V1:(Collision with motor vehicle in traffic) V2:(Collision with motor vehicle in traffic)                                              | V1:(Passenger car) V2:(Passenger car)                                                                                                                                   |                   | Dry          | Daylight               | Clear             | NEEDHAM ST                                                     | Local police  |
| 4016508                                                 | 1/3/2015   | Saturday  | 11:10 PM   | NEWTON    | Property damage only (none injured) | 0                           | 0                        | Angle                     | V1: Travelling straight ahead / V2:Backing                                                              | V1:E / V2:S               | V1:(Collision with motor vehicle in traffic) V2:(Collision with motor vehicle in traffic)                                              | V1:(Passenger car) V2:()                                                                                                                                                |                   | Snow         | Dark - lighted roadway | Snow/Rain         | WINCHESTER ST                                                  | Local police  |
| 4016529                                                 | 2/23/2015  | Monday    | 6:02 PM    | NEWTON    | Property damage only (none injured) | 0                           | 0                        | Rear-end                  | V1: Changing lanes / V2:Travelling straight ahead                                                       | V1:E / V2:E               | V1:(Collision with motor vehicle in traffic) V2:(Collision with motor vehicle in traffic)                                              | V1:(Light truck(van, mini-van, panel, pickup, sport utility) with only four tires) V2:(Light truck(van, mini-van, panel, pickup, sport utility) with only               |                   | Wet          | Dark - lighted roadway | Clear/Clear       | WINCHESTER ST / NEEDHAM ST                                     | Local police  |
| 4021772                                                 | 3/3/2015   | Tuesday   | 8:13 AM    | NEWTON    | Property damage only (none injured) | 0                           | 0                        | Rear-end                  | V1: Slowing or stopped in traffic / V2:Slowing or stopped in traffic / V3:Slowing or stopped in traffic | V1:W / V2:W / V3:W        | V1:() V2:(Collision with motor vehicle in traffic) V3:(Collision with motor vehicle in traffic)                                        | V1:(Passenger car) V2:(Light truck(van, mini-van, panel, pickup, sport utility) with only                                                                               |                   | Ice          | Daylight               | Cloudy/Cloudy     | WINCHESTER ST                                                  | Local police  |
| 4033702                                                 | 4/2/2015   | Thursday  | 5:26 PM    | NEWTON    | Non-fatal injury                    | 2                           | 0                        | Rear-end                  | V1: Travelling straight ahead / V2:Travelling straight ahead                                            | V1:E / V2:E               | V1:(Collision with motor vehicle in traffic) V2:(Collision with motor vehicle in traffic)                                              | V1:(Light truck(van, mini-van, panel, pickup, sport utility) with only four tires) V2:(Passenger car)                                                                   |                   | Dry          | Daylight               | Clear             | NEEDHAM ST                                                     | Local police  |
| 15: Winchester Street at Route 9 EB Service Road        |            |           |            |           |                                     |                             |                          |                           |                                                                                                         |                           |                                                                                                                                        |                                                                                                                                                                         |                   |              |                        |                   |                                                                |               |
| 3621232                                                 | 10/16/2013 | Wednesday | 9:50 AM    | NEWTON    | Property damage only (none injured) | 0                           | 0                        | Rear-end                  | V1: Travelling straight ahead / V2:Travelling straight ahead                                            | V1:N / V2:N               | V1:(Collision with motor vehicle in traffic) V2:(Other non-collision)                                                                  | V1:(Single-unit truck (3-or-more axles)) V2:(Passenger car)                                                                                                             |                   | Dry          | Daylight               | Cloudy            | CENTRE STREET / WINCHESTER STREET                              | Local police  |
| 3646103                                                 | 10/31/2013 | Thursday  | 9:34 AM    | NEWTON    | Property damage only (none injured) | 0                           | 0                        | Rear-end                  | V1: Turning left / V2:Turning left                                                                      | V1:S / V2:S               | V1:(Collision with motor vehicle in traffic) V2:(Collision with motor vehicle in traffic)                                              | V1:(Light truck(van, mini-van, panel, pickup, sport utility) with only four tires) V2:(Passenger car)                                                                   |                   | Dry          | Daylight               | Cloudy            | CENTRE ST / WINCHESTER ST                                      | Local police  |
| 2693874                                                 | 2/11/2011  | Friday    | 5:23 PM    | NEWTON    | Property damage only (none injured) | 0                           | 0                        | Angle                     | V1: Entering traffic lane / V2:Overtaking/passing                                                       | V1:W / V2:N               | V1:(Collision with motor vehicle in traffic) V2:()                                                                                     | V1:(Light truck(van, mini-van, panel, pickup, sport utility) with only four tires) V2:(Passenger car)                                                                   |                   | Dry          | Dusk                   | Clear             | BOYLSTON STREET / WINCHESTER STREET                            | Local police  |
| 3588840                                                 | 9/4/2013   | Wednesday | 8:20 AM    | NEWTON    | Property damage only (none injured) | 0                           | 0                        | Sideswipe, same direction | V1: Travelling straight ahead / V2:Travelling straight ahead / V3:Travelling straight ahead             | V1:N / V2:N / V3:N        | V1:(Collision with motor vehicle in traffic) V2:(Collision with motor vehicle in traffic) V3:(Collision with motor vehicle in traffic) | V1:(Light truck(van, mini-van, panel, pickup, sport utility) with only four tires) V2:(Truck/trailer) V3:(Light truck(van, mini-van, panel, pickup, sport utility) with |                   | Dry          | Daylight               | Clear/Clear       | CENTRE STREET / WINCHESTER STREET                              | Local police  |
| 3782020                                                 | 3/14/2014  | Friday    | 3:04 PM    | NEWTON    | Non-fatal injury                    | 1                           | 0                        | Angle                     | V1: Slowing or stopped in traffic / V2:Travelling straight ahead                                        | V1:S / V2:N               | V1:(Collision with motor vehicle in traffic) V2:(Collision with motor vehicle in traffic)                                              | V1:(Passenger car) V2:(Light truck(van, mini-van, panel, pickup, sport utility) with only                                                                               |                   | Dry          | Daylight               | Clear/Clear       | CENTRE STREET / WINCHESTER STREET                              | Local police  |
| 3981615                                                 | 12/1/2014  | Monday    | 8:37 AM    | NEWTON    | Property damage only (none injured) | 0                           | 0                        | Angle                     | V1: Turning left / V2:Travelling straight ahead                                                         | V1:N / V2:S               | V1:(Collision with motor vehicle in traffic) V2:(Collision with motor vehicle in traffic)                                              | V1:(Passenger car) V2:(Passenger car)                                                                                                                                   |                   | Dry          | Daylight               | Clear             | CENTRE ST / WINCHESTER ST                                      | Local police  |
| 3428417                                                 | 5/21/2013  | Tuesday   | 8:50 AM    | NEWTON    | Property damage only (none injured) | 0                           | 0                        | Angle                     | V1: Turning left / V2:Travelling straight ahead                                                         | V1:N / V2:S               | V1:(Collision with motor vehicle in traffic) V2:(Collision with motor vehicle in traffic)                                              | V1:(Unknown heavy truck, cannot classify) V2:(Passenger car)                                                                                                            |                   | Dry          | Daylight               | Clear/Clear       | CENTRE STREET / WINCHESTER STREET                              | Local police  |
| 3541294                                                 | 7/18/2013  | Thursday  | 8:51 PM    | NEWTON    | Non-fatal injury                    | 1                           | 0                        | Not reported              | V1: Turning left                                                                                        | V1:E                      | V1:(Collision with pedestrian)                                                                                                         | V1:(Light truck(van, mini-van, panel, pickup, sport utility) with only four tires)                                                                                      | P3:Pedestrian     | Not reported | Not reported           | Not Reported      | CENTRE ST / WINCHESTER ST / BOYLSTON ST                        | Local police  |
| 3785194                                                 | 3/25/2014  | Tuesday   | 6:12 PM    | NEWTON    | Property damage only (none injured) | 0                           | 0                        | Angle                     | V1: Travelling straight ahead / V2:Turning left                                                         | V1:N / V2:S               | V1:(Collision with motor vehicle in traffic) V2:(Collision with motor vehicle in traffic)                                              | V1:(Light truck(van, mini-van, panel, pickup, sport utility) with only four tires) V2:(Light truck(van, mini-van, panel, pickup, sport utility) with only               |                   | Dry          | Daylight               | Clear             | WINCHESTER STREET / BOYLSTON-WINCHESTER STREETS SERVICE ROAD   | Local police  |
| 3800209                                                 | 4/29/2014  | Tuesday   | 9:57 AM    | NEWTON    | Not Reported                        | 0                           | 0                        | Angle                     | V1: Travelling straight ahead / V2:Travelling straight ahead                                            | V1:N / V2:W               | V1:(Collision with motor vehicle in traffic) V2:(Collision with motor vehicle in traffic)                                              | V1:(Light truck(van, mini-van, panel, pickup, sport utility) with only four tires) V2:(Single-unit truck (3-or-more axles))                                             |                   | Dry          | Daylight               | Cloudy            | CENTRE STREET / WINCHESTER STREET                              | Local police  |
| 2753350                                                 | 8/12/2011  | Friday    | 4:09 PM    | NEWTON    | Property damage only (none injured) | 0                           | 0                        | Angle                     | V1: Turning left / V2:Travelling straight ahead                                                         | V1:N / V2:E               | V1:(Collision with motor vehicle in traffic) V2:(Collision with motor vehicle in traffic)                                              | V1:(Passenger car) V2:(Passenger car)                                                                                                                                   |                   | Dry          | Daylight               | Clear             | WINCHESTER STREET / BOYLSTON-WINCHESTER STREETS SERVICE ROAD / | Local police  |

| Crash Number                                     | Crash Date | Weekday   | Crash Time | City/Town | Crash Severity                      | Number of NonFatal Injuries | Number of Fatal Injuries | Manner of Collision           | Vehicle Action Prior to Crash                                    | Vehicle Travel Directions | Most Harmful Events                                                                                                            | Vehicle Configuration                                                                                                                                     | Non Motorist Type                                   | Road Surface | Ambient Light          | Weather Condition | Roadway                                                        | Police Agency |
|--------------------------------------------------|------------|-----------|------------|-----------|-------------------------------------|-----------------------------|--------------------------|-------------------------------|------------------------------------------------------------------|---------------------------|--------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------|--------------|------------------------|-------------------|----------------------------------------------------------------|---------------|
| 15: Winchester Street at Route 9 EB Service Road |            |           |            |           |                                     |                             |                          |                               |                                                                  |                           |                                                                                                                                |                                                                                                                                                           |                                                     |              |                        |                   |                                                                |               |
| 2782521                                          | 10/12/2011 | Wednesday | 7:55 AM    | NEWTON    | Non-fatal injury                    | 1                           | 0                        | Not reported                  | V1: Turning right                                                | V1:8                      | V1:(Collision with cyclist (bicycle, tricycle, unicycle, pedal car))                                                           | V1:(Passenger car)                                                                                                                                        | P2:Pedalcyclist (bicycle, tricycle, unicycle, pedal | Not reported | Not reported           | Not Reported      | CENTRE ST / WINCHESTER ST                                      | Local police  |
| 3250535                                          | 8/29/2012  | Wednesday | 8:44 AM    | NEWTON    | Property damage only (none injured) | 0                           | 0                        | Angle                         | V1: Turning left / V2:Slowing or stopped in traffic              | V1:N / V2:N               | V1:(Collision with motor vehicle in traffic) V2:(Collision with motor vehicle in traffic)                                      | V1:(Passenger car) V2:(Passenger car)                                                                                                                     |                                                     | Dry          | Daylight               | Clear             | CENTRE ST / WINCHESTER ST                                      | Local police  |
| 3867681                                          | 6/20/2014  | Friday    | 3:42 PM    | NEWTON    | Property damage only (none injured) | 0                           | 0                        | Angle                         | V1: Slowing or stopped in traffic / V2:Turning left              | V1:W / V2:S               | V1:(Collision with motor vehicle in traffic) V2:(Collision with motor vehicle in traffic)                                      | V1:(Passenger car) V2:(Light truck(van, mini-van, panel, pickup, sport utility) with only                                                                 |                                                     | Dry          | Daylight               | Clear             | CENTRE ST / WINCHESTER ST                                      | Local police  |
| 3883757                                          | 7/11/2014  | Friday    | 9:34 AM    | NEWTON    | Property damage only (none injured) | 0                           | 0                        | Rear-end                      | V1: Slowing or stopped in traffic / V2:Turning left              | V1:8 / V2:S               | V1:(Collision with motor vehicle in traffic) V2:(Collision with motor vehicle in traffic)                                      | V1:(Light truck(van, mini-van, panel, pickup, sport utility) with only four tires) V2:(Passenger car)                                                     |                                                     | Dry          | Daylight               | Clear             | WINCHESTER STREET / BOYLSTON-WINCHESTER STREETS SERVICE ROAD   | Local police  |
| 3902197                                          | 8/4/2014   | Monday    | 4:12 PM    | NEWTON    | Non-fatal injury                    | 1                           | 0                        | Sideswipe, opposite direction | V1: Travelling straight ahead / V2:Turning left                  | V1:N / V2:S               | V1:(Collision with motor vehicle in traffic) V2:(Collision with motor vehicle in traffic)                                      | V1:(Light truck(van, mini-van, panel, pickup, sport utility) with only four tires) V2:(Light truck(van, mini-van, panel, pickup, sport utility) with only |                                                     | Not reported | Daylight               | Clear             | CENTRE ST / WINCHESTER ST                                      | Local police  |
| 4024291                                          | 3/13/2015  | Friday    | 7:49 PM    | NEWTON    | Non-fatal injury                    | 2                           | 0                        | Angle                         | V1: Entering traffic lane / V2:Travelling straight ahead         | V1:W / V2:N               | V1:(Collision with motor vehicle in traffic) V2:(Collision with motor vehicle in traffic)                                      | V1:(Passenger car) V2:(Passenger car)                                                                                                                     |                                                     | Dry          | Dark - lighted roadway | Clear             | CENTRE ST / WINCHESTER ST                                      | Local police  |
| 4029940                                          | 3/27/2015  | Friday    | 9:33 AM    | NEWTON    | Property damage only (none injured) | 0                           | 0                        | Angle                         | V1: Travelling straight ahead / V2:Turning left                  | V1:N / V2:W               | V1:(Collision with motor vehicle in traffic) V2:(Collision with motor vehicle in traffic)                                      | V1:(Passenger car) V2:(Passenger car)                                                                                                                     |                                                     | Wet          | Daylight               | Rain/Cloudy       | WINCHESTER STREET / BOYLSTON-WINCHESTER STREETS SERVICE ROAD / | Local police  |
| 4132218                                          | 12/9/2015  | Wednesday | 2:50 PM    | NEWTON    | Non-fatal injury                    | 1                           | 0                        | Single vehicle crash          | V1: Travelling straight ahead                                    | V1:S                      | V1:(Collision with pedestrian)                                                                                                 | V1:(Passenger car)                                                                                                                                        | P3:Pedestrian                                       | Dry          | Daylight               | Clear             | WINCHESTER ST / CENTRE STREET                                  | Local police  |
| 16: Winchester Street at Route 9 WB Service Road |            |           |            |           |                                     |                             |                          |                               |                                                                  |                           |                                                                                                                                |                                                                                                                                                           |                                                     |              |                        |                   |                                                                |               |
| 3611201                                          | 9/30/2013  | Monday    | 6:32 PM    | NEWTON    | Non-fatal injury                    | 1                           | 0                        | Single vehicle                | V1: Travelling straight ahead                                    | V1:S                      | V1:(Collision with pedestrian)                                                                                                 | V1:(Passenger car)                                                                                                                                        | P2:Pedestrian                                       | Dry          | Daylight               | Clear             | CENTRE ST                                                      | Local police  |
| 3654814                                          | 11/2/2013  | Saturday  | 12:21 PM   | NEWTON    | Property damage only (none injured) | 0                           | 0                        | Angle                         | V1: Turning left / V2:Leaving traffic lane                       | V1:W / V2:S               | V1:(Collision with motor vehicle in traffic) V2:(Collision with motor vehicle in traffic)                                      | V1:(Passenger car) V2:(Passenger car)                                                                                                                     |                                                     | Dry          | Daylight               | Clear             | CENTRE STREET / BOYLSTON-CENTRE STREETS SERVICE ROAD           | Local police  |
| 3655226                                          | 10/21/2013 | Monday    | 6:45 PM    | NEWTON    | Property damage only (none injured) | 0                           | 0                        | Rear-end                      | V1: Travelling straight ahead / V2:Parked                        | V1:W / V2:W               | V1:(Collision with parked motor vehicle) V2:(Collision with motor vehicle in traffic)                                          | V1:(Passenger car) V2:(Passenger car)                                                                                                                     |                                                     | Dry          | Dark - lighted roadway | Clear             | BOYLSTON STREET Rte UNKNOW                                     | State police  |
| 4054670                                          | 6/17/2015  | Wednesday | 7:23 AM    | NEWTON    | Property damage only (none injured) | 0                           | 0                        | Rear-end                      | V1: Slowing or stopped in traffic / V2:Travelling straight ahead | V1:N / V2:N               | V1:(Collision with motor vehicle in traffic) V2:(Collision with motor vehicle in traffic)                                      | V1:(Light truck(van, mini-van, panel, pickup, sport utility) with only four tires) V2:(Passenger car)                                                     |                                                     | Dry          | Daylight               | Clear             | CENTRE STREET / BOYLSTON-CENTRE STREETS SERVICE ROAD           | Local police  |
| 3999375                                          | 1/7/2015   | Wednesday | 7:44 AM    | NEWTON    | Property damage only (none injured) | 0                           | 0                        | Angle                         | V1: Travelling straight ahead / V2:Turning left                  | V1:S / V2:W               | V1:(Collision with motor vehicle in traffic) V2:(Collision with motor vehicle in traffic)                                      | V1:(Passenger car) V2:(Passenger car)                                                                                                                     |                                                     | Dry          | Daylight               | Clear             | CENTRE STREET / BOYLSTON-CENTRE STREETS SERVICE ROAD           | Local police  |
| 2774397                                          | 9/25/2011  | Sunday    | 3:24 AM    | NEWTON    | Non-fatal injury                    | 1                           | 0                        | Rear-end                      | V1: Travelling straight ahead / V2:Parked / V3:Parked            | V1:W / V2:8 / V3:8        | V1:(Collision with parked motor vehicle) V2:(Collision with motor vehicle in traffic) V3:(Collision with parked motor vehicle) | V1:(Passenger car) V2:(Passenger car) V3:(Passenger car)                                                                                                  |                                                     | Dry          | Dark - lighted roadway | Cloudy            | BOYLSTON ST Rte 9 W                                            | Local police  |
| 3254876                                          | 9/18/2012  | Tuesday   | 5:15 PM    | NEWTON    | Property damage only (none injured) | 0                           | 0                        | Angle                         | V1: Turning left / V2:Travelling straight ahead                  | V1:S / V2:N               | V1:(Collision with motor vehicle in traffic) V2:(Collision with motor vehicle in traffic)                                      | V1:(Light truck(van, mini-van, panel, pickup, sport utility) with only four tires) V2:(Passenger car)                                                     |                                                     | Wet          | Dusk                   | Cloudy/Rain       | BOYLSTON-CENTRE STREETS SERVICE ROAD / CENTRE STREET           | Local police  |
| 4129836                                          | 12/17/2015 | Thursday  | 3:45 PM    | NEWTON    | Non-fatal injury                    | 1                           | 0                        | Angle                         | V1: Turning left / V2:Travelling straight ahead                  | V1:W / V2:N               | V1:(Collision with motor vehicle in traffic) V2:(Collision with motor vehicle in traffic)                                      | V1:(Light truck(van, mini-van, panel, pickup, sport utility) with only four tires) V2:(Passenger car)                                                     |                                                     | Wet          | Dusk                   | Rain              | CENTRE STREET / BOYLSTON-CENTRE STREETS SERVICE ROAD           | Local police  |

| Crash Number                       | Crash Date | Weekday   | Crash Time | City/Town | Crash Severity                      | Number of NonFatal Injuries | Number of Fatal Injuries | Manner of Collision           | Vehicle Action Prior to Crash                                        | Vehicle Travel Directions | Most Harmful Events                                                                       | Vehicle Configuration                                                                                                                                     | Non Motorist Type | Road Surface | Ambient Light          | Weather Condition | Roadway                       | Police Agency |
|------------------------------------|------------|-----------|------------|-----------|-------------------------------------|-----------------------------|--------------------------|-------------------------------|----------------------------------------------------------------------|---------------------------|-------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------|--------------|------------------------|-------------------|-------------------------------|---------------|
| 17: Centre Street at Walnut Street |            |           |            |           |                                     |                             |                          |                               |                                                                      |                           |                                                                                           |                                                                                                                                                           |                   |              |                        |                   |                               |               |
| 2785707                            | 10/7/2011  | Friday    | 6:55 AM    | NEWTON    | Not Reported                        | 0                           | 0                        | Rear-end                      | V1: Travelling straight ahead / V2:Travelling straight ahead         | V1:W / V2:W               | V1:(Collision with motor vehicle in traffic) V2:(Collision with motor vehicle in traffic) | V1:(Passenger car) V2:(Passenger car)                                                                                                                     |                   | Not reported | Daylight               | Clear/Clear       | CENTRE ST / WALNUT ST         | Local police  |
| 3240828                            | 8/9/2012   | Thursday  | 10:07 PM   | NEWTON    | Not Reported                        | 0                           | 0                        | Angle                         | V1: Parked / V2:Backing                                              | V1:E / V2:N               | V1:(Collision with motor vehicle in traffic) V2:(Collision with parked motor vehicle)     | V1:(Passenger car) V2:(Passenger car)                                                                                                                     |                   | Dry          | Dark - lighted roadway | Clear/Clear       | CENTRE ST                     | Local police  |
| 3790132                            | 4/1/2014   | Tuesday   | 6:27 AM    | NEWTON    | Property damage only (none injured) | 0                           | 0                        | Angle                         | V1: Turning left / V2:Travelling straight ahead                      | V1:N / V2:W               | V1:(Collision with motor vehicle in traffic) V2:(Collision with motor vehicle in traffic) | V1:(Unknown heavy truck, cannot classify) V2:(Passenger car)                                                                                              |                   | Dry          | Daylight               | Clear             | CENTRE STREET / WALNUT STREET | Local police  |
| 3794082                            | 3/14/2014  | Friday    | 11:23 PM   | NEWTON    | Non-fatal injury                    | 2                           | 0                        | Rear-end                      | V1: Backing / V2:Parked                                              | V1:S / V2:S               | V1:(Collision with parked motor vehicle) V2:(Collision with motor vehicle in traffic)     | V1:(Passenger car) V2:(Passenger car)                                                                                                                     |                   | Dry          | Other                  | Clear             | CENTRE ST                     | Local police  |
| 3795724                            | 4/19/2014  | Saturday  | 8:58 AM    | NEWTON    | Not Reported                        | 0                           | 0                        | Single vehicle                | V1: Unknown                                                          | V1:S                      | V1:(Unknown)                                                                              | V1:()                                                                                                                                                     |                   | Dry          | Daylight               | Clear             | CENTRE ST / WALNUT ST         | Local police  |
| 4024390                            | 3/13/2015  | Friday    | 5:37 PM    | NEWTON    | Property damage only (none injured) | 0                           | 0                        | Sideswipe, same direction     | V1: Travelling straight ahead / V2:Travelling straight ahead         | V1:E / V2:E               | V1:(Collision with motor vehicle in traffic) V2:(Collision with motor vehicle in traffic) | V1:(Passenger car) V2:(Bus (seats for 7-15 people, including driver))                                                                                     |                   | Wet          | Daylight               | Clear/Clear       | CENTRE STREET                 | Local police  |
| 4027551                            | 3/23/2015  | Monday    | 11:06 AM   | NEWTON    | Non-fatal injury                    | 1                           | 0                        | Rear-end                      | V1: Slowing or stopped in traffic / V2:Backing                       | V1:E / V2:W               | V1:(Collision with motor vehicle in traffic) V2:(Collision with motor vehicle in traffic) | V1:(Passenger car) V2:(Tractor/semi-trailer)                                                                                                              |                   | Dry          | Daylight               | Clear/Clear       | CENTRE STREET / WALNUT STREET | Local police  |
| 4027553                            | 3/23/2015  | Monday    | 11:16 AM   | NEWTON    | Property damage only (none injured) | 0                           | 0                        | Rear-end                      | V1: Slowing or stopped in traffic / V2:Backing                       | V1:W / V2:E               | V1:(Collision with motor vehicle in traffic) V2:(Collision with parked motor vehicle)     | V1:(Light truck(van, mini-van, panel, pickup, sport utility) with only four tires) V2:(Truck/trailer)                                                     |                   | Dry          | Daylight               | Clear/Clear       | CENTRE STREET / WALNUT STREET | Local police  |
| 4035603                            | 4/17/2015  | Friday    | 5:34 PM    | NEWTON    | Property damage only (none injured) | 0                           | 0                        | Sideswipe, same direction     | V1: Travelling straight ahead / V2:Parked                            | V1:S / V2:S               | V1:(Collision with parked motor vehicle) V2:(Collision with motor vehicle in traffic)     | V1:(Light truck(van, mini-van, panel, pickup, sport utility) with only four tires) V2:(Light truck(van, mini-van, panel, pickup, sport utility) with only |                   | Dry          | Daylight               | Clear/Clear       | WALNUT STREET                 | Local police  |
| 2683052                            | 1/18/2011  | Tuesday   | 8:42 AM    | NEWTON    | Not Reported                        | 0                           | 0                        | Single vehicle crash          | V1: Travelling straight ahead / V2:Slowing or stopped in traffic     | V1:N / V2:N               | V1:(Collision with motor vehicle in traffic) V2:(Collision with motor vehicle in traffic) | V1:(Single-unit truck (3-or-more axles)) V2:(Light truck(van, mini-van, panel, pickup, sport utility) with only four tires)                               |                   | Snow         | Daylight               | Snow/Snow         | CENTRE ST / WALNUT ST         | Local police  |
| 2689714                            | 2/9/2011   | Wednesday | 8:00 PM    | NEWTON    | Property damage only (none injured) | 0                           | 0                        | Sideswipe, opposite direction | V1: Parked / V2:Backing                                              | V1:U / V2:E               | V1:(Collision with motor vehicle in traffic) V2:(Collision with parked motor vehicle)     | V1:(Passenger car) V2:(Passenger car)                                                                                                                     |                   | Dry          | Dark - lighted roadway | Clear             | CENTRE ST                     | Local police  |
| 2693885                            | 2/15/2011  | Tuesday   | 5:48 PM    | NEWTON    | Non-fatal injury                    | 2                           | 0                        | Rear-end                      | V1: Slowing or stopped in traffic / V2:Slowing or stopped in traffic | V1:W / V2:W               | V1:(Collision with motor vehicle in traffic) V2:(Collision with motor vehicle in traffic) | V1:(Passenger car) V2:(Passenger car)                                                                                                                     |                   | Dry          | Dark - lighted roadway | Clear             | CENTRE ST / WALNUT ST         | Local police  |
| 2887697                            | 1/23/2012  | Monday    | 2:03 PM    | NEWTON    | Property damage only (none injured) | 0                           | 0                        | Rear-end                      | V1: Slowing or stopped in traffic / V2:Travelling straight ahead     | V1:S / V2:S               | V1:(Collision with motor vehicle in traffic) V2:(Collision with motor vehicle in traffic) | V1:(Passenger car) V2:(Light truck(van, mini-van, panel, pickup, sport utility) with only                                                                 |                   | Dry          | Daylight               | Clear             | CENTRE ST / WALNUT ST         | Local police  |
| 3356134                            | 2/5/2013   | Tuesday   | 4:49 PM    | NEWTON    | Property damage only (none injured) | 0                           | 0                        | Sideswipe, same direction     | V1: Turning right / V2:Travelling straight ahead                     | V1:N / V2:N               | V1:(Collision with motor vehicle in traffic) V2:(Collision with motor vehicle in traffic) | V1:(Passenger car) V2:(Light truck(van, mini-van, panel, pickup, sport utility) with only                                                                 |                   | Dry          | Dawn                   | Clear             | CENTRE ST                     | Local police  |
| 3363677                            | 2/25/2013  | Monday    | 2:00 PM    | NEWTON    | Property damage only (none injured) | 0                           | 0                        | Rear-end                      | V1: Slowing or stopped in traffic / V2:Slowing or stopped in traffic | V1:S / V2:S               | V1:(Collision with motor vehicle in traffic) V2:(Collision with motor vehicle in traffic) | V1:(Passenger car) V2:(Light truck(van, mini-van, panel, pickup, sport utility) with only                                                                 |                   | Dry          | Daylight               | Clear             | CENTRE ST / WALNUT ST         | Local police  |
| 3370351                            | 3/14/2013  | Thursday  | 10:20 AM   | NEWTON    | Property damage only (none injured) | 0                           | 0                        | Sideswipe, same direction     | V1: Parked / V2:Backing                                              | V1:W / V2:W               | V1:(Collision with motor vehicle in traffic) V2:(Collision with parked motor vehicle)     | V1:(Light truck(van, mini-van, panel, pickup, sport utility) with only four tires) V2:(Passenger car)                                                     |                   | Dry          | Daylight               | Cloudy            | CENTRE ST                     | Local police  |
| 3654881                            | 9/26/2013  | Thursday  | 8:37 PM    | NEWTON    | Property damage only (none injured) | 0                           | 0                        | Single vehicle crash          | V1: Turning right                                                    | V1:E                      | V1:(Collision with light pole or other post/support)                                      | V1:(Tractor/semi-trailer)                                                                                                                                 |                   | Dry          | Dark - lighted roadway | Clear             | CENTRE STREET                 | Local police  |
| 3665306                            | 10/19/2013 | Saturday  | 11:12 AM   | NEWTON    | Property damage only (none injured) | 0                           | 0                        | Sideswipe, same direction     | V1: Slowing or stopped in traffic / V2:Changing lanes                | V1:N / V2:N               | V1:(Collision with motor vehicle in traffic) V2:(Collision with motor vehicle in traffic) | V1:(Light truck(van, mini-van, panel, pickup, sport utility) with only four tires) V2:(Passenger car)                                                     |                   | Dry          | Daylight               | Clear             | CENTRE ST / WALNUT ST         | Local police  |
| 3862176                            | 6/12/2014  | Thursday  | 2:40 PM    | NEWTON    | Non-fatal injury                    | 2                           | 0                        | Rear-end                      | V1: Slowing or stopped in traffic / V2:Travelling straight ahead     | V1:S / V2:S               | V1:(Collision with motor vehicle in traffic) V2:(Collision with motor vehicle in traffic) | V1:(Light truck(van, mini-van, panel, pickup, sport utility) with only                                                                                    |                   | Dry          | Daylight               | Clear/Cloudy      | CENTRE ST / WALNUT ST         | Local police  |
| 3967950                            | 10/14/2014 | Tuesday   | 1:14 PM    | NEWTON    | Non-fatal injury                    | 1                           | 0                        | Sideswipe, same direction     | V1: Travelling straight ahead / V2:Entering traffic lane             | V1:S / V2:S               | V1:(Collision with motor vehicle in traffic) V2:(Collision with motor vehicle in traffic) | V1:(Light truck(van, mini-van, panel, pickup, sport utility) with only four tires) V2:(Passenger car)                                                     |                   | Dry          | Daylight               | Cloudy            | WALNUT ST                     | Local police  |

| Crash Number                       | Crash Date | Weekday   | Crash Time | City/Town | Crash Severity                      | Number of NonFatal Injuries | Number of Fatal Injuries | Manner of Collision           | Vehicle Action Prior to Crash                                        | Vehicle Travel Directions | Most Harmful Events                                                                                                                    | Vehicle Configuration                                                                                                                                     | Non Motorist Type | Road Surface | Ambient Light          | Weather Condition                      | Roadway                       | Police Agency |
|------------------------------------|------------|-----------|------------|-----------|-------------------------------------|-----------------------------|--------------------------|-------------------------------|----------------------------------------------------------------------|---------------------------|----------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------|--------------|------------------------|----------------------------------------|-------------------------------|---------------|
| 17: Centre Street at Walnut Street |            |           |            |           |                                     |                             |                          |                               |                                                                      |                           |                                                                                                                                        |                                                                                                                                                           |                   |              |                        |                                        |                               |               |
| 3986073                            | 12/12/2014 | Friday    | 4:59 PM    | NEWTON    | Property damage only (none injured) | 0                           | 0                        | Sideswipe, same direction     | V1: Travelling straight ahead / V2:Entering traffic lane / V3:Parked | V1:S / V2:S / V3:S        | V1:(Collision with motor vehicle in traffic) V2:(Collision with motor vehicle in traffic) V3:(Collision with motor vehicle in traffic) | V1:(Passenger car) V2:(Passenger car) V3:(Passenger car)                                                                                                  |                   | Dry          | Dark - lighted roadway | Clear                                  | CENTRE ST / WALNUT ST         | Local police  |
| 3987782                            | 12/24/2014 | Wednesday | 6:07 PM    | NEWTON    | Property damage only (none injured) | 0                           | 0                        | Angle                         | V1: Travelling straight ahead / V2:Turning left                      | V1:S / V2:N               | V1:(Collision with motor vehicle in traffic) V2:(Collision with motor vehicle in traffic)                                              | V1:(Passenger car) V2:(Passenger car)                                                                                                                     |                   | Wet          | Dark - lighted roadway | Rain                                   | CENTRE ST / WALNUT ST         | Local police  |
| 4070104                            | 7/10/2015  | Friday    | 8:49 PM    | NEWTON    | Property damage only (none injured) | 0                           | 0                        | Sideswipe, same direction     | V1: Travelling straight ahead / V2:Turning right                     | V1:N / V2:N               | V1:(Collision with motor vehicle in traffic) V2:(Collision with motor vehicle in traffic)                                              | V1:(Passenger car) V2:(Light truck(van, mini-van, panel, pickup, sport utility) with only                                                                 |                   | Dry          | Dusk                   | Clear                                  | CENTRE ST                     | Local police  |
| 4072642                            | 7/27/2015  | Monday    | 8:49 AM    | NEWTON    | Property damage only (none injured) | 0                           | 0                        | Sideswipe, same direction     | V1: Travelling straight ahead / V2:Slowing or stopped in traffic     | V1:N / V2:N               | V1:(Collision with motor vehicle in traffic) V2:(Collision with motor vehicle in traffic)                                              | V1:(Unknown heavy truck, cannot classify) V2:(Bus (seats for 7-15 people, including driver))                                                              |                   | Not reported | Daylight               | Clear                                  | CENTRE STREET                 | Local police  |
| 4080513                            | 8/25/2015  | Tuesday   | 12:27 PM   | NEWTON    | Property damage only (none injured) | 0                           | 0                        | Angle                         | V1: Parked / V2:Travelling straight ahead                            | V1:E / V2:S               | V1:(Collision with motor vehicle in traffic) V2:(Collision with parked motor vehicle)                                                  | V1:(Passenger car) V2:(Light truck(van, mini-van, panel, pickup, sport utility) with only                                                                 |                   | Dry          | Daylight               | Cloudy                                 | WALNUT ST                     | Local police  |
| 2727020                            | 5/11/2011  | Wednesday | 12:30 PM   | NEWTON    | Property damage only (none injured) | 0                           | 0                        | Sideswipe, same direction     | V1: Parked / V2:Travelling straight ahead                            | V1:S / V2:S               | V1:(Collision with motor vehicle in traffic) V2:(Collision with parked motor vehicle)                                                  | V1:(Light truck(van, mini-van, panel, pickup, sport utility) with only four tires) V2:(Light truck(van, mini-van, panel, pickup, sport utility) with only |                   | Dry          | Daylight               | Clear/Clear                            | CENTRE ST / WALNUT ST         | Local police  |
| 2727027                            | 5/24/2011  | Tuesday   | 5:35 PM    | NEWTON    | Not Reported                        | 0                           | 0                        | Not reported                  | V1: Parked                                                           |                           | V1:(Collision with motor vehicle in traffic)                                                                                           | V1:(Passenger car)                                                                                                                                        |                   | Not reported | Not reported           | Not Reported                           | WALNUT ST                     | Local police  |
| 3041322                            | 4/17/2012  | Tuesday   | 6:29 PM    | NEWTON    | Property damage only (none injured) | 0                           | 0                        | Head-on                       | V1: Travelling straight ahead / V2:Turning left                      | V1:S / V2:N               | V1:(Collision with motor vehicle in traffic) V2:()                                                                                     | V1:(Passenger car) V2:(Passenger car)                                                                                                                     |                   | Dry          | Daylight               | Clear/Clear                            | WALNUT ST / CENTRE ST         | Local police  |
| 3451735                            | 6/1/2013   | Saturday  | 6:42 AM    | NEWTON    | Property damage only (none injured) | 0                           | 0                        | Single vehicle crash          | V1: Backing / V2:Travelling straight ahead                           | V1:W / V2:E               | V1:(Collision with motor vehicle in traffic) V2:(Collision with motor vehicle in traffic)                                              | V1:(Tractor/semi-trailer) V2:(Passenger car)                                                                                                              |                   | Dry          | Daylight               | Clear/Clear                            | CENTRE STREET / WALNUT STREET | Local police  |
| 3512603                            | 7/10/2013  | Wednesday | 9:47 PM    | NEWTON    | Property damage only (none injured) | 0                           | 0                        | Angle                         | V1: Travelling straight ahead / V2:Travelling straight ahead         | V1:N / V2:E               | V1:(Collision with motor vehicle in traffic) V2:(Collision with motor vehicle in traffic)                                              | V1:(Light truck(van, mini-van, panel, pickup, sport utility) with only four tires) V2:(Passenger car)                                                     |                   | Wet          | Dark - lighted roadway | Rain/Rain                              | CENTRE STREET / WALNUT STREET | Local police  |
| 3700186                            | 12/22/2013 | Sunday    | 8:44 AM    | NEWTON    | Unknown                             | 0                           | 0                        | Single vehicle crash          | V1: Unknown                                                          | V1:U                      | V1:(Collision with utility pole)                                                                                                       | V1:(Unknown heavy truck, cannot classify)                                                                                                                 |                   | Wet          | Daylight               | Cloudy                                 | WALNUT STREET                 | Local police  |
| 3711537                            | 12/28/2013 | Saturday  | 11:49 PM   | NEWTON    | Non-fatal injury                    | 1                           | 0                        | Single vehicle                | V1: Turning right                                                    | V1:S                      | V1:(Collision with pedestrian)                                                                                                         | V1:(Passenger car)                                                                                                                                        | P2:Pedestrian     | Dry          | Dark - lighted         | Clear                                  | CENTRE ST / WALNUT ST         | Local police  |
| 4052404                            | 5/31/2015  | Sunday    | 7:59 AM    | NEWTON    | Non-fatal injury                    | 2                           | 0                        | Angle                         | V1: Travelling straight ahead / V2:Travelling straight ahead         | V1:S / V2:N               | V1:(Collision with motor vehicle in traffic) V2:(Collision with motor vehicle in traffic)                                              | V1:(Passenger car) V2:(Passenger car)                                                                                                                     |                   | Dry          | Daylight               | Cloudy/Cloudy                          | CENTRE ST / WALNUT ST         | Local police  |
| 4054787                            | 6/13/2015  | Saturday  | 1:10 PM    | NEWTON    | Property damage only (none injured) | 0                           | 0                        | Single vehicle crash          | V1: Turning right                                                    | V1:S                      | V1:(Collision with light pole or other post/support)                                                                                   | V1:(Tractor/doubles)                                                                                                                                      |                   | Dry          | Daylight               | Cloudy/Cloudy                          | CENTRE STREET / WALNUT STREET | Local police  |
| 4094630                            | 9/3/2015   | Thursday  | 9:20 PM    | NEWTON    | Property damage only (none injured) | 0                           | 0                        | Angle                         | V1: Turning left                                                     | V1:W                      | V1:(Collision with highway traffic sign post)                                                                                          | V1:(Tractor/semi-trailer)                                                                                                                                 |                   | Dry          | Dark - lighted roadway | Clear/Clear                            | CENTRE STREET / WALNUT STREET | Local police  |
| 3407611                            | 5/5/2013   | Sunday    | 3:09 PM    | NEWTON    | Property damage only (none injured) | 0                           | 0                        | Rear-end                      | V1: Slowing or stopped in traffic / V2:Slowing or stopped in traffic | V1:S / V2:S               | V1:(Collision with motor vehicle in traffic) V2:(Collision with motor vehicle in traffic)                                              | V1:(Passenger car) V2:(Light truck(van, mini-van, panel, pickup, sport utility) with only                                                                 |                   | Dry          | Daylight               | Clear/Clear                            | CENTRE ST                     | Local police  |
| 3428283                            | 5/26/2013  | Sunday    | 4:26 PM    | NEWTON    | Non-fatal injury                    | 1                           | 0                        | Rear-end                      | V1: Slowing or stopped in traffic / V2:Slowing or stopped in traffic | V1:W / V2:W               | V1:(Collision with motor vehicle in traffic) V2:(Collision with motor vehicle in traffic)                                              | V1:(Motorcycle) V2:(Passenger car)                                                                                                                        |                   | Dry          | Daylight               | Clear                                  | CENTRE ST / WALNUT ST         | Local police  |
| 3996163                            | 1/17/2015  | Saturday  | 9:27 AM    | NEWTON    | Property damage only (none injured) | 0                           | 0                        | Angle                         | V1: Turning left / V2:Travelling straight ahead                      | V1:W / V2:E               | V1:(Collision with motor vehicle in traffic) V2:(Collision with motor vehicle in traffic)                                              | V1:(Light truck(van, mini-van, panel, pickup, sport utility) with only four tires) V2:(Passenger car)                                                     |                   | Dry          | Daylight               | Clear                                  | CENTRE ST / WALNUT ST         | Local police  |
| 4009274                            | 2/7/2015   | Saturday  | 6:16 PM    | NEWTON    | Property damage only (none injured) | 0                           | 0                        | Sideswipe, opposite direction | V1: Travelling straight ahead / V2:Slowing or stopped in traffic     | V1:S / V2:N               | V1:(Collision with motor vehicle in traffic) V2:(Collision with motor vehicle in traffic)                                              | V1:(Single-unit truck (2-axle, 6-tire)) V2:(Light truck(van, mini-van, panel, pickup, sport utility) with only four tires)                                |                   | Wet          | Dark - lighted roadway | Sleet, hail (freezing rain or drizzle) | CENTRE STREET / WALNUT STREET | Local police  |
| 4121372                            | 11/20/2015 | Friday    | 7:06 PM    | NEWTON    | Non-fatal injury                    | 1                           | 0                        | Single vehicle                | V1: Travelling straight ahead                                        | V1:S                      | V1:(Collision with pedestrian)                                                                                                         | V1:(Passenger car)                                                                                                                                        | P2:Pedestrian     | Dry          | Dark - lighted         | Clear                                  | CENTRE ST / WALNUT ST         | Local police  |



| Crash Number                             | Crash Date | Weekday   | Crash Time | City/Town | Crash Severity                      | Number of NonFatal Injuries | Number of Fatal Injuries | Manner of Collision           | Vehicle Action Prior to Crash                                                               | Vehicle Travel Directions | Most Harmful Events                                                                                                                    | Vehicle Configuration                                                                                                                                     | Non Motorist Type                                   | Road Surface | Ambient Light              | Weather Condition                                            | Roadway                     | Police Agency |
|------------------------------------------|------------|-----------|------------|-----------|-------------------------------------|-----------------------------|--------------------------|-------------------------------|---------------------------------------------------------------------------------------------|---------------------------|----------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------|--------------|----------------------------|--------------------------------------------------------------|-----------------------------|---------------|
| 18: Nahanton Street at Winchester Street |            |           |            |           |                                     |                             |                          |                               |                                                                                             |                           |                                                                                                                                        |                                                                                                                                                           |                                                     |              |                            |                                                              |                             |               |
| 3243677                                  | 8/16/2012  | Thursday  | 8:48 AM    | NEWTON    | Property damage only (none injured) | 0                           | 0                        | Head-on                       | V1: Travelling straight ahead / V2:Parked / V3:Parked                                       | V1:N / V2:6 / V3:6        | V1:(Collision with parked motor vehicle) V2:(Other non-collision) V3:(Other non-collision)                                             | V1:(Passenger car) V2:(Passenger car) V3:(Light truck(van, mini-van, panel, pickup, sport utility) with only four tires)                                  |                                                     | Wet          | Daylight                   | Clear                                                        | NAHANTON ST                 | Local police  |
| 3254871                                  | 9/12/2012  | Wednesday | 8:02 AM    | NEWTON    | Property damage only (none injured) | 0                           | 0                        | Sideswipe, same direction     | V1: Travelling straight ahead / V2:Changing lanes                                           | V1:W / V2:W               | V1:(Collision with motor vehicle in traffic) V2:(Collision with motor vehicle in traffic)                                              | V1:(Light truck(van, mini-van, panel, pickup, sport utility) with only four tires) V2:(Passenger car)                                                     |                                                     | Dry          | Daylight                   | Clear                                                        | NAHANTON ST                 | Local police  |
| 3265218                                  | 9/26/2012  | Wednesday | 7:23 AM    | NEWTON    | Non-fatal injury                    | 1                           | 0                        | Single vehicle crash          | V1: Travelling straight ahead                                                               | V1:E                      | V1:(Collision with tree)                                                                                                               | V1:(Passenger car)                                                                                                                                        |                                                     | Wet          | Daylight                   | Rain/Cloudy                                                  | NAHANTON STREET             | Local police  |
| 4027449                                  | 11/9/2014  | Sunday    | 11:22 AM   | NEWTON    | Not Reported                        | 0                           | 0                        | Rear-end                      | V1: Not reported / V2:Parked                                                                | V1:8 / V2:N               | V1:() V2:(Collision with motor vehicle in traffic)                                                                                     | V1:() V2:(Passenger car)                                                                                                                                  |                                                     | Dry          | Daylight                   | Clear                                                        | NAHANTON ST                 | Local police  |
| 2689802                                  | 2/8/2011   | Tuesday   | 2:32 PM    | NEWTON    | Not Reported                        | 0                           | 0                        | Sideswipe, opposite direction | V1: Travelling straight ahead / V2:Travelling straight ahead                                | V1:N / V2:S               | V1:(Collision with motor vehicle in traffic) V2:(Collision with motor vehicle in traffic)                                              | V1:(Light truck(van, mini-van, panel, pickup, sport utility) with only four tires) V2:(Light truck(van, mini-van, panel, pickup, sport utility) with only |                                                     | Wet          | Daylight                   | Sleet, hail (freezing rain or drizzle)/Sleet, hail (freezing | NAHANTON ST / WINCHESTER ST | Local police  |
| 2711213                                  | 4/1/2011   | Friday    | 4:39 AM    | NEWTON    | Property damage only (none injured) | 0                           | 0                        | Single vehicle crash          | V1: Travelling straight ahead                                                               | V1:S                      | V1:(Collision with tree)                                                                                                               | V1:(Passenger car)                                                                                                                                        |                                                     | Snow         | Dark - lighted roadway     | hail (freezing rain or drizzle)                              | WINCHESTER ST               | Local police  |
| 3299856                                  | 12/1/2012  | Saturday  | 12:04 PM   | NEWTON    | Non-fatal injury                    | 1                           | 0                        | Single vehicle crash          | V1: Travelling straight ahead                                                               | V1:E                      | V1:(Collision with utility pole)                                                                                                       | V1:(Light truck(van, mini-van, panel, pickup, sport utility) with only four tires)                                                                        |                                                     | Wet          | Daylight                   | Snow/Sleet, hail (freezing rain or drizzle)                  | NAHANTON ST                 | Local police  |
| 3620314                                  | 10/16/2013 | Wednesday | 8:31 AM    | NEWTON    | Non-fatal injury                    | 1                           | 0                        | Angle                         | V1: Turning right                                                                           | V1:N                      | V1:(Collision with cyclist (bicycle, tricycle, unicycle, pedal car))                                                                   | V1:(Light truck(van, mini-van, panel, pickup, sport utility) with only four tires)                                                                        | P2:Pedalcyclist (bicycle, tricycle, unicycle, pedal | Dry          | Daylight                   | Clear/Clear                                                  | NAHANTON ST                 | Local police  |
| 3676189                                  | 11/20/2013 | Wednesday | 1:10 PM    | NEWTON    | Property damage only (none injured) | 0                           | 0                        | Angle                         | V1: Travelling straight ahead / V2:Entering traffic lane / V3:Slowing or stopped in traffic | V1:W / V2:W / V3:W        | V1:(Collision with motor vehicle in traffic) V2:(Collision with motor vehicle in traffic) V3:(Collision with motor vehicle in traffic) | V1:(Passenger car) V2:(Passenger car) V3:(Passenger car)                                                                                                  |                                                     | Dry          | Daylight                   | Clear                                                        | NAHANTON ST / WINCHESTER ST | Local police  |
| 3872096                                  | 6/25/2014  | Wednesday | 3:11 PM    | NEWTON    | Non-fatal injury                    | 1                           | 0                        | Angle                         | V1: Travelling straight ahead / V2:Parked                                                   | V1:S / V2:S               | V1:(Collision with utility pole) V2:(Collision with motor vehicle in traffic)                                                          | V1:(Passenger car) V2:(Passenger car)                                                                                                                     |                                                     | Dry          | Daylight                   | Clear/Clear                                                  | NAHANTON ST / WINCHESTER ST | Local police  |
| 3901902                                  | 7/15/2014  | Tuesday   | 8:51 PM    | NEWTON    | Non-fatal injury                    | 1                           | 0                        | Angle                         | V1: Making U-turn                                                                           | V1:S                      | V1:(Collision with cyclist (bicycle, tricycle, unicycle, pedal car))                                                                   | V1:(Passenger car)                                                                                                                                        |                                                     | Dry          | Dark - lighted roadway     | Cloudy/Cloudy                                                | NAHANTON ST / WINCHESTER ST | Local police  |
| 3990529                                  | 11/26/2014 | Wednesday | 4:08 PM    | NEWTON    | Non-fatal injury                    | 2                           | 0                        | Head-on                       | V1: Travelling straight ahead / V2:Travelling straight ahead                                | V1:N / V2:S               | V1:(Collision with motor vehicle in traffic) V2:(Collision with motor vehicle in traffic)                                              | V1:(Passenger car) V2:(Passenger car)                                                                                                                     |                                                     | Slush        | Dark - lighted roadway     | Snow/Rain                                                    | NAHANTON ST / WINCHESTER ST | Local police  |
| 3689138                                  | 12/12/2013 | Thursday  | 10:32 AM   | NEWTON    | Non-fatal injury                    | 1                           | 0                        | Single vehicle                | V1: Travelling straight ahead                                                               | V1:W                      | V1:(Collision with tree)                                                                                                               | V1:(Passenger car)                                                                                                                                        |                                                     | Dry          | Daylight                   | Clear/Clear                                                  | NAHANTON ST / WINCHESTER ST | Local police  |
| 3385996                                  | 4/6/2013   | Saturday  | 6:21 PM    | NEWTON    | Property damage only (none injured) | 0                           | 0                        | Single vehicle crash          | V1: Turning left                                                                            | V1:N                      | V1:(Collision with tree)                                                                                                               | V1:(Light truck(van, mini-van, panel, pickup, sport utility) with only four tires)                                                                        |                                                     | Dry          | Daylight                   | Clear                                                        | NAHANTON ST / WINCHESTER ST | Local police  |
| 3428273                                  | 5/20/2013  | Monday    | 8:09 AM    | NEWTON    | Non-fatal injury                    | 1                           | 0                        | Angle                         | V1: Turning left / V2:Travelling straight ahead                                             | V1:S / V2:W               | V1:(Collision with motor vehicle in traffic) V2:(Collision with motor vehicle in traffic)                                              | V1:(Passenger car) V2:(Passenger car)                                                                                                                     |                                                     | Dry          | Daylight                   | Cloudy/Cloudy                                                | NAHANTON ST / WINCHESTER ST | Local police  |
| 3748553                                  | 2/13/2014  | Thursday  | 3:32 PM    | NEWTON    | Property damage only (none injured) | 0                           | 0                        | Single vehicle crash          | V1: Slowing or stopped in traffic                                                           | V1:W                      | V1:(Other)                                                                                                                             | V1:(Light truck(van, mini-van, panel, pickup, sport utility) with only four tires)                                                                        |                                                     | Slush        | Daylight                   | Snow                                                         | NAHANTON ST                 | Local police  |
| 4129840                                  | 12/17/2015 | Thursday  | 6:23 PM    | NEWTON    | Property damage only (none injured) | 0                           | 0                        | Angle                         | V1: Turning left / V2:Travelling straight ahead                                             | V1:E / V2:S               | V1:(Collision with motor vehicle in traffic) V2:(Collision with motor vehicle in traffic)                                              | V1:(Passenger car) V2:(Passenger car)                                                                                                                     |                                                     | Wet          | Dark - roadway not lighted | Rain/Rain                                                    | NAHANTON ST / WINCHESTER ST | Local police  |

| Crash Number                                       | Crash Date | Weekday   | Crash Time | City/Town | Crash Severity                      | Number of NonFatal Injuries | Number of Fatal Injuries | Manner of Collision | Vehicle Action Prior to Crash                                                                       | Vehicle Travel Directions | Most Harmful Events                                                                            | Vehicle Configuration                                                                                                                                     | Non Motorist Type                                   | Road Surface | Ambient Light          | Weather Condition | Roadway                   | Police Agency |
|----------------------------------------------------|------------|-----------|------------|-----------|-------------------------------------|-----------------------------|--------------------------|---------------------|-----------------------------------------------------------------------------------------------------|---------------------------|------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------|--------------|------------------------|-------------------|---------------------------|---------------|
| 19: Nahanton Street at Wells Avenue / JCC Driveway |            |           |            |           |                                     |                             |                          |                     |                                                                                                     |                           |                                                                                                |                                                                                                                                                           |                                                     |              |                        |                   |                           |               |
| 2801265                                            | 11/14/2011 | Monday    | 8:01 PM    | NEWTON    | Not Reported                        | 0                           | 0                        | Head-on             | V1: Parked / V2:Unknown                                                                             | V1:U / V2:U               | V1:(Collision with parked motor vehicle) V2:(Collision with parked motor vehicle)              | V1:(Passenger car) V2:(Light truck(van, mini-van, panel, pickup, sport utility) with only                                                                 |                                                     | Dry          | Unknown                | Clear             | NAHANTON ST               | Local police  |
| 3219344                                            | 7/26/2012  | Thursday  | 8:02 AM    | NEWTON    | Property damage only (none injured) | 0                           | 0                        | Angle               | V1: Travelling straight ahead / V2:Turning left                                                     | V1:N / V2:S               | V1:(Collision with motor vehicle in traffic) V2:(Collision with motor vehicle in traffic)      | V1:(Light truck(van, mini-van, panel, pickup, sport utility) with only four tires) V2:(Passenger car)                                                     |                                                     | Dry          | Daylight               | Cloudy            | NAHANTON ST / WELLS AVE   | Local police  |
| 3556762                                            | 8/1/2013   | Thursday  | 7:20 AM    | NEWTON    | Property damage only (none injured) | 0                           | 0                        | Angle               | V1: Turning left / V2:Travelling straight ahead                                                     | V1:W / V2:E               | V1:(Collision with motor vehicle in traffic) V2:(Collision with motor vehicle in traffic)      | V1:(Passenger car) V2:(Light truck(van, mini-van, panel, pickup, sport utility) with only                                                                 |                                                     | Dry          | Daylight               | Clear/Clear       | NAHANTON ST / WELLS AVE   | Local police  |
| 3556772                                            | 8/11/2013  | Sunday    | 9:06 AM    | NEWTON    | Non-fatal injury                    | 1                           | 0                        | Angle               | V1: Turning left                                                                                    | V1:E                      | V1:(Collision with cyclist (bicycle, tricycle, unicycle, pedal car))                           | V1:(Passenger car)                                                                                                                                        | P3:Pedalcyclist (bicycle, tricycle, unicycle, pedal | Dry          | Daylight               | Clear/Clear       | NAHANTON ST / WELLS AVE   | Local police  |
| 3802921                                            | 4/14/2014  | Monday    | 10:29 AM   | NEWTON    | Non-fatal injury                    | 1                           | 0                        | Angle               | V1: Turning right                                                                                   | V1:W                      | V1:(Collision with tree)                                                                       | V1:(Passenger car)                                                                                                                                        |                                                     | Dry          | Daylight               | Clear             | NAHANTON ST / WELLS AVE   | Local police  |
| 4054668                                            | 6/15/2015  | Monday    | 5:50 PM    | NEWTON    | Property damage only (none injured) | 0                           | 0                        | Rear-end            | V1: Entering traffic lane / V2:Entering traffic lane                                                | V1:E / V2:E               | V1:(Collision with motor vehicle in traffic) V2:(Collision with motor vehicle in traffic)      | V1:(Passenger car) V2:(Passenger car)                                                                                                                     |                                                     | Wet          | Daylight               | Cloudy/Rain       | WELLS AVE                 | Local police  |
| 2723430                                            | 5/11/2011  | Wednesday | 5:49 PM    | NEWTON    | Non-fatal injury                    | 1                           | 0                        | Not reported        | V1: Backing                                                                                         | V1:S                      | V1:(Collision with pedestrian)                                                                 | V1:(Light truck(van, mini-van, panel, pickup, sport utility) with only four tires)                                                                        | P3:Pedestrian                                       | Not reported | Not reported           | Not Reported      | NAHANTON ST               | Local police  |
| 2736959                                            | 6/29/2011  | Wednesday | 12:40 AM   | NEWTON    | Property damage only (none injured) | 0                           | 0                        | Not reported        | V1: Travelling straight ahead                                                                       | V1:N                      | V1:(Collision with tree)                                                                       | V1:(Light truck(van, mini-van, panel, pickup, sport utility) with only four tires)                                                                        |                                                     | Not reported | Not reported           | Not Reported      | NAHANTON ST               | Local police  |
| 3321953                                            | 12/8/2012  | Saturday  | 5:26 PM    | NEWTON    | Property damage only (none injured) | 0                           | 0                        | Angle               | V1: Turning left / V2:Travelling straight ahead                                                     | V1:W / V2:E               | V1:(Collision with motor vehicle in traffic) V2:(Collision with motor vehicle in traffic)      | V1:(Passenger car) V2:(Passenger car)                                                                                                                     |                                                     | Wet          | Dark - lighted roadway | Cloudy            | NAHANTON ST / WELLS AVE   | Local police  |
| 3347070                                            | 1/10/2013  | Thursday  | 8:04 AM    | NEWTON    | Non-fatal injury                    | 2                           | 0                        | Angle               | V1: Turning left / V2:Travelling straight ahead                                                     | V1:S / V2:N               | V1:(Collision with motor vehicle in traffic) V2:(Collision with motor vehicle in traffic)      | V1:(Light truck(van, mini-van, panel, pickup, sport utility) with only four tires) V2:(Passenger car)                                                     |                                                     | Dry          | Daylight               | Clear             | WELLS AVE                 | Local police  |
| 3407592                                            | 4/26/2013  | Friday    | 1:43 PM    | NEWTON    | Property damage only (none injured) | 0                           | 0                        | Rear-end            | V1: Slowing or stopped in traffic / V2:Slowing or stopped in traffic                                | V1:N / V2:N               | V1:(Collision with motor vehicle in traffic) V2:(Collision with motor vehicle in traffic)      | V1:(Light truck(van, mini-van, panel, pickup, sport utility) with only four tires) V2:(Light truck(van, mini-van, panel, pickup, sport utility) with only |                                                     | Dry          | Daylight               | Clear/Clear       | WELLS AVE                 | Local police  |
| 4100194                                            | 10/9/2015  | Friday    | 6:08 PM    | NEWTON    | Non-fatal injury                    | 1                           | 0                        | Angle               | V1: Travelling straight ahead / V2:Turning left                                                     | V1:S / V2:N               | V1:(Collision with motor vehicle in traffic) V2:(Collision with motor vehicle in traffic)      | V1:(Light truck(van, mini-van, panel, pickup, sport utility) with only four tires) V2:(Passenger car)                                                     |                                                     | Wet          | Dark - lighted roadway | Rain              | NAHANTON ST / WELLS AVE   | Local police  |
| 2713739                                            | 3/4/2011   | Friday    | 8:10 AM    | NEWTON    | Property damage only (none injured) | 0                           | 0                        | Angle               | V1: Turning left / V2:Travelling straight ahead                                                     | V1:S / V2:E               | V1:(Collision with motor vehicle in traffic) V2:(Collision with motor vehicle in traffic)      | V1:(Passenger car) V2:(Light truck(van, mini-van, panel, pickup, sport utility) with only                                                                 |                                                     | Dry          | Daylight               | Clear             | NAHANTON ST. / WELLS AVE. | Local police  |
| 3356144                                            | 2/11/2013  | Monday    | 11:50 AM   | NEWTON    | Not Reported                        | 0                           | 0                        | Head-on             | V1: Travelling straight ahead / V2:Travelling straight ahead                                        | V1:N / V2:E               | V1:(Collision with motor vehicle in traffic) V2:(Collision with motor vehicle in traffic)      | V1:(Passenger car) V2:(Passenger car)                                                                                                                     |                                                     | Wet          | Daylight               | Rain/Rain         | WELLS AVE / NAHANTON ST   | Local police  |
| 3665345                                            | 11/19/2013 | Tuesday   | 8:39 AM    | NEWTON    | Non-fatal injury                    | 1                           | 0                        | Rear-end            | V1: Slowing or stopped in traffic / V2:Travelling straight ahead                                    | V1:E / V2:E               | V1:(Collision with motor vehicle in traffic) V2:(Collision with motor vehicle in traffic)      | V1:(Light truck(van, mini-van, panel, pickup, sport utility) with only four tires) V2:(Light truck(van, mini-van, panel, pickup, sport utility) with only |                                                     | Dry          | Daylight               | Clear             | NAHANTON ST / WELLS AVE   | Local police  |
| 3987778                                            | 12/22/2014 | Monday    | 10:40 AM   | NEWTON    | Property damage only (none injured) | 0                           | 0                        | Rear-end            | V1: Slowing or stopped in traffic / V2:Slowing or stopped in traffic / V3:Travelling straight ahead | V1:W / V2:W / V3:W        | V1:(Other non-collision) V2:(Other non-collision) V3:(Collision with motor vehicle in traffic) | V1:(Passenger car) V2:(Passenger car) V3:(Light truck(van, mini-van, panel, pickup, sport utility) with only four tires)                                  |                                                     | Dry          | Daylight               | Cloudy            | NAHANTON ST / WELLS AVE   | Local police  |
| 3987791                                            | 12/16/2014 | Tuesday   | 6:35 PM    | NEWTON    | Property damage only (none injured) | 0                           | 0                        | Rear-end            | V1: Slowing or stopped in traffic / V2:Travelling straight ahead                                    | V1:W / V2:W               | V1:(Collision with motor vehicle in traffic) V2:(Collision with motor vehicle in traffic)      | V1:(Passenger car) V2:(Passenger car)                                                                                                                     |                                                     | Dry          | Dark - lighted roadway | Clear/Clear       | WELLS AVE                 | Local police  |
| 3999372                                            | 12/22/2014 | Monday    | 6:57 PM    | NEWTON    | Non-fatal injury                    | 1                           | 0                        | Rear-end            | V1: Slowing or stopped in traffic / V2:Slowing or stopped in traffic                                | V1:N / V2:N               | V1:(Collision with motor vehicle in traffic) V2:(Collision with motor vehicle in traffic)      | V1:(Passenger car) V2:(Passenger car)                                                                                                                     |                                                     | Wet          | Dark - lighted roadway | Rain              | NAHANTON ST / WELLS AVE   | Local police  |
| 3999387                                            | 1/20/2015  | Tuesday   | 12:04 PM   | NEWTON    | Non-fatal injury                    | 1                           | 0                        | Angle               | V1: Turning left / V2:Travelling straight ahead                                                     | V1:N / V2:E               | V1:(Collision with motor vehicle in traffic) V2:(Collision with motor vehicle in traffic)      | V1:(Light truck(van, mini-van, panel, pickup, sport utility) with only four tires) V2:(Passenger car)                                                     |                                                     | Dry          | Daylight               | Clear             | NAHANTON ST / WELLS AVE   | Local police  |
| 4121348                                            | 12/2/2015  | Wednesday | 4:36 PM    | NEWTON    | Non-fatal injury                    | 1                           | 0                        | Rear-end            | V1: Entering traffic lane / V2:Travelling straight ahead                                            | V1:W / V2:W               | V1:(Collision with motor vehicle in traffic) V2:(Collision with motor vehicle in traffic)      | V1:(Passenger car) V2:(Passenger car)                                                                                                                     |                                                     | Wet          | Dark - lighted roadway | Rain              | WELLS AVE                 | Local police  |

| Crash Number                            | Crash Date | Weekday   | Crash Time | City/Town | Crash Severity                      | Number of NonFatal Injuries | Number of Fatal Injuries | Manner of Collision           | Vehicle Action Prior to Crash                                                                       | Vehicle Travel Directions | Most Harmful Events                                                                                                                    | Vehicle Configuration                                                                                                                                     | Non Motorist Type | Road Surface | Ambient Light                   | Weather Condition | Roadway                            | Police Agency |
|-----------------------------------------|------------|-----------|------------|-----------|-------------------------------------|-----------------------------|--------------------------|-------------------------------|-----------------------------------------------------------------------------------------------------|---------------------------|----------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------|--------------|---------------------------------|-------------------|------------------------------------|---------------|
| 20: Highland Avenue at Riverside Street |            |           |            |           |                                     |                             |                          |                               |                                                                                                     |                           |                                                                                                                                        |                                                                                                                                                           |                   |              |                                 |                   |                                    |               |
| 2783179                                 | 8/11/2011  | Thursday  | 12:43 PM   | NEEDHAM   | Property damage only (none injured) | 0                           | 0                        | Angle                         | V1: Travelling straight ahead / V2:Turning left                                                     | V1:W / V2:S               | V1:(Collision with motor vehicle in traffic) V2:(Collision with motor vehicle in traffic)                                              | V1:() V2:()                                                                                                                                               |                   | Dry          | Daylight                        | Clear             | / HIGHLAND AVENUE                  | Local police  |
| 2783206                                 | 7/23/2011  | Saturday  | 1:30 PM    | NEEDHAM   | Property damage only (none injured) | 0                           | 0                        | Angle                         | V1: Travelling straight ahead / V2:Turning left                                                     | V1:8 / V2:8               | V1:(Collision with motor vehicle in traffic) V2:()                                                                                     | V1:() V2:()                                                                                                                                               |                   | Dry          | Daylight                        | Clear             | HIGHLAND AVENUE / RIVERSIDE STREET | Local police  |
| 3248221                                 | 5/25/2012  | Friday    | 5:50 PM    | NEEDHAM   | Property damage only (none injured) | 0                           | 0                        | Rear-end                      | V1: Turning left / V2:Travelling straight ahead                                                     | V1:N / V2:N               | V1:(Collision with motor vehicle in traffic) V2:(Collision with motor vehicle in traffic)                                              | V1:(Light truck(van, mini-van, panel, pickup, sport utility) with only four tires) V2:(Passenger car)                                                     |                   | Dry          | Daylight                        | Clear             | HIGHLAND AVENUE                    | Local police  |
| 3413266                                 | 1/24/2013  | Thursday  | 10:15 AM   | NEEDHAM   | Non-fatal injury                    | 2                           | 0                        | Rear-end                      | V1: Travelling straight ahead / V2:Slowing or stopped in traffic                                    | V1:E / V2:E               | V1:(Collision with motor vehicle in traffic) V2:(Collision with motor vehicle in traffic)                                              | V1:(Light truck(van, mini-van, panel, pickup, sport utility) with only four tires) V2:(Light truck(van, mini-van, panel, pickup, sport utility) with only |                   | Dry          | Dark - unknown roadway lighting | Clear/Clear       | HIGHLAND AVENUE / RIVERSIDE STREET | Local police  |
| 3925460                                 | 5/12/2014  | Monday    | 12:53 PM   | NEEDHAM   | Property damage only (none injured) | 0                           | 0                        | Rear-end                      | V1: Travelling straight ahead / V2:Slowing or stopped in traffic                                    | V1:E / V2:E               | V1:(Collision with motor vehicle in traffic) V2:(Collision with motor vehicle in traffic)                                              | V1:(Light truck(van, mini-van, panel, pickup, sport utility) with only four tires) V2:(Light truck(van, mini-van, panel, pickup, sport utility) with only |                   | Dry          | Daylight                        | Clear             | HIGHLAND AVENUE / RIVERSIDE STREET | Local police  |
| 3925482                                 | 5/28/2014  | Wednesday | 1:35 PM    | NEEDHAM   | Property damage only (none injured) | 0                           | 0                        | Rear-end                      | V1: Travelling straight ahead / V2:Slowing or stopped in traffic                                    | V1:N / V2:N               | V1:(Collision with motor vehicle in traffic) V2:(Collision with motor vehicle in traffic)                                              | V1:(Passenger car) V2:(Light truck(van, mini-van, panel, pickup, sport utility) with only                                                                 |                   | Wet          | Daylight                        | Rain/Cloudy       | HIGHLAND AVE                       | Local police  |
| 2729436                                 | 5/15/2011  | Sunday    | 2:00 PM    | NEEDHAM   | Property damage only (none injured) | 0                           | 0                        | Angle                         | V1: Travelling straight ahead / V2:Turning left                                                     | V1:8 / V2:8               | V1:() V2:()                                                                                                                            | V1:(Light truck(van, mini-van, panel, pickup, sport utility) with only four tires) V2:(Light truck(van, mini-van, panel, pickup, sport utility) with only |                   | Wet          | Daylight                        | Rain/Cloudy       | HIGHLAND AVENUE / HIGHLAND CIRCLE  | Local police  |
| 2729678                                 | 5/18/2011  | Wednesday | 8:40 AM    | NEEDHAM   | Property damage only (none injured) | 0                           | 0                        | Rear-end                      | V1: Travelling straight ahead / V2:Travelling straight ahead                                        | V1:N / V2:N               | V1:(Collision with motor vehicle in traffic) V2:(Collision with motor vehicle in traffic)                                              | V1:(Light truck(van, mini-van, panel, pickup, sport utility) with only four tires) V2:(Light truck(van, mini-van, panel, pickup, sport utility) with only |                   | Wet          | Daylight                        | Cloudy/Rain       | HIGHLAND AVENUE / HIGHLAND CIRCLE  | Local police  |
| 2993830                                 | 12/23/2011 | Friday    | 11:15 AM   | NEEDHAM   | Property damage only (none injured) | 0                           | 0                        | Rear-end                      | V1: Travelling straight ahead / V2:Travelling straight ahead                                        | V1:8 / V2:8               | V1:() V2:()                                                                                                                            | V1:(Passenger car) V2:(Passenger car)                                                                                                                     |                   | Wet          | Daylight                        | Cloudy            | HIGHLAND AVENUE / HIGHLAND CIRCLE  | Local police  |
| 3095717                                 | 3/8/2012   | Thursday  | 11:50 AM   | NEEDHAM   | Property damage only (none injured) | 0                           | 0                        | Rear-end                      | V1: Travelling straight ahead / V2:Slowing or stopped in traffic                                    | V1:N / V2:8               | V1:(Collision with motor vehicle in traffic) V2:(Collision with motor vehicle in traffic)                                              | V1:(Passenger car) V2:(Passenger car)                                                                                                                     |                   | Dry          | Daylight                        | Clear             | HIGHLAND AVENUE                    | Local police  |
| 3993640                                 | 6/30/2014  | Monday    | 4:15 PM    | NEEDHAM   | Property damage only (none injured) | 0                           | 0                        | Sideswipe, opposite direction | V1: Backing / V2:Parked                                                                             | V1:E / V2:E               | V1:(Other) V2:(Collision with parked motor vehicle)                                                                                    | V1:(Light truck(van, mini-van, panel, pickup, sport utility) with only four tires) V2:(Passenger car)                                                     |                   | Dry          | Daylight                        | Clear/Clear       | HIGHLAND AVE                       | Local police  |
| 3995138                                 | 9/4/2014   | Thursday  | 6:45 PM    | NEEDHAM   | Non-fatal injury                    | 1                           | 0                        | Angle                         | V1: Turning right / V2:Travelling straight ahead                                                    | V1:W / V2:W               | V1:(Collision with moped) V2:(Collision with motor vehicle in traffic)                                                                 | V1:(Light truck(van, mini-van, panel, pickup, sport utility) with only four tires) V2:(Other)                                                             |                   | Dry          | Dusk                            | Clear             | HIGHLAND AVENUE / RIVERSIDE STREET | Local police  |
| 2707393                                 | 2/4/2011   | Friday    | 6:05 PM    | NEEDHAM   | Property damage only (none injured) | 0                           | 0                        | Rear-end                      | V1: Slowing or stopped in traffic / V2:Travelling straight ahead                                    | V1:E / V2:E               | V1:(Collision with motor vehicle in traffic) V2:(Collision with motor vehicle in traffic)                                              | V1:(Light truck(van, mini-van, panel, pickup, sport utility) with only four tires) V2:()                                                                  |                   | Wet          | Dark - lighted roadway          | Cloudy            | HIGHLAND AVENUE / HIGHLAND CIRCLE  | Local police  |
| 3545760                                 | 7/17/2013  | Wednesday | 2:04 PM    | NEEDHAM   | Property damage only (none injured) | 0                           | 0                        | Single vehicle crash          | V1: Backing                                                                                         | V1:8                      | V1:(Collision with other movable object)                                                                                               | V1:(Light truck(van, mini-van, panel, pickup, sport utility) with only four tires)                                                                        |                   | Dry          | Daylight                        | Clear/Cloudy      | HIGHLAND AVE                       | Local police  |
| 3545761                                 | 7/22/2013  | Monday    | 7:12 PM    | NEEDHAM   | Property damage only (none injured) | 0                           | 0                        | Sideswipe, opposite direction | V1: Travelling straight ahead / V2:Travelling straight ahead                                        | V1:S / V2:N               | V1:(Collision with motor vehicle in traffic) V2:(Collision with motor vehicle in traffic)                                              | V1:(Light truck(van, mini-van, panel, pickup, sport utility) with only four tires) V2:(Passenger car)                                                     |                   | Dry          | Daylight                        | Clear/Clear       | HIGHLAND AVE                       | Local police  |
| 3774389                                 | 11/16/2013 | Saturday  | 3:10 PM    | NEEDHAM   | Property damage only (none injured) | 0                           | 0                        | Rear-end                      | V1: Slowing or stopped in traffic / V2:Slowing or stopped in traffic / V3:Travelling straight ahead | V1:W / V2:W / V3:W        | V1:(Collision with motor vehicle in traffic) V2:(Collision with motor vehicle in traffic) V3:(Collision with motor vehicle in traffic) | V1:(Passenger car) V2:(Passenger car) V3:(Light truck(van, mini-van, panel, pickup, sport utility) with only four tires)                                  |                   | Dry          | Daylight                        | Clear/Clear       | HIGHLAND AVE                       | Local police  |
| 4073550                                 | 2/10/2015  | Tuesday   | 1:20 PM    | NEEDHAM   | Property damage only (none injured) | 0                           | 0                        | Angle                         | V1: Backing / V2:Travelling straight ahead                                                          | V1:E / V2:S               | V1:(Collision with motor vehicle in traffic) V2:(Collision with motor vehicle in traffic)                                              | V1:(Passenger car) V2:(Single-unit truck (2-axle, 6-tire))                                                                                                |                   | Snow         | Daylight                        | Cloudy/Cloudy     | RIVERSIDE STREET                   | Local police  |
| 4158657                                 | 9/19/2015  | Saturday  | 12:50 PM   | NEEDHAM   | Property damage only (none injured) | 0                           | 0                        | Single vehicle crash          | V1: Travelling straight ahead / V2:Slowing or stopped in traffic / V3:Slowing or stopped in traffic | V1:N / V2:N / V3:N        | V1:(Collision with motor vehicle in traffic) V2:(Collision with motor vehicle in traffic) V3:(Collision with motor vehicle in traffic) | V1:(Passenger car) V2:(Passenger car) V3:(Passenger car)                                                                                                  |                   | Dry          | Daylight                        | Clear             | HIGHLAND AVE                       | Local police  |
| 4173184                                 | 11/20/2015 | Friday    | 6:45 PM    | NEEDHAM   | Property damage only (none injured) | 0                           | 0                        | Rear-end                      | V1: Travelling straight ahead / V2:Travelling straight ahead                                        | V1:W / V2:W               | V1:(Collision with motor vehicle in traffic) V2:(Collision with motor vehicle in traffic)                                              | V1:(Passenger car) V2:(Light truck(van, mini-van, panel, pickup, sport utility) with only                                                                 |                   | Dry          | Dark - lighted roadway          | Clear             | HIGHLAND AVE                       | Local police  |

| Crash Number                                              | Crash Date | Weekday   | Crash Time | City/Town | Crash Severity                      | Number of NonFatal Injuries | Number of Fatal Injuries | Manner of Collision | Vehicle Action Prior to Crash                                                                                                          | Vehicle Travel Directions | Most Harmful Events                                                                                                                                                                 | Vehicle Configuration                                                                                                                                                   | Non Motorist Type | Road Surface | Ambient Light          | Weather Condition | Roadway                                              | Police Agency |
|-----------------------------------------------------------|------------|-----------|------------|-----------|-------------------------------------|-----------------------------|--------------------------|---------------------|----------------------------------------------------------------------------------------------------------------------------------------|---------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------|--------------|------------------------|-------------------|------------------------------------------------------|---------------|
| 21: Highland Avenue at Highland Terrace / Highland Circle |            |           |            |           |                                     |                             |                          |                     |                                                                                                                                        |                           |                                                                                                                                                                                     |                                                                                                                                                                         |                   |              |                        |                   |                                                      |               |
| 3925501                                                   | 6/17/2014  | Tuesday   | 9:07 AM    | NEEDHAM   | Property damage only (none injured) | 0                           | 0                        | Angle               | V1: Turning left / V2:Travelling straight ahead                                                                                        | V1:N / V2:W               | V1:(Collision with motor vehicle in traffic) V2:(Collision with motor vehicle in traffic)                                                                                           | V1:(Light truck(van, mini-van, panel, pickup, sport utility) with only four tires) V2:(Passenger car)                                                                   |                   | Dry          | Daylight               | Clear/Clear       | HIGHLAND AVE / HIGHLAND TER                          | Local police  |
| 3775137                                                   | 10/24/2013 | Thursday  | 1:24 PM    | NEEDHAM   | Property damage only (none injured) | 0                           | 0                        | Rear-end            | V1: Travelling straight ahead / V2:Travelling straight ahead                                                                           | V1:E / V2:8               | V1:(Collision with motor vehicle in traffic) V2:(Collision with motor vehicle in traffic)                                                                                           | V1:(Passenger car) V2:(Light truck(van, mini-van, panel, pickup, sport utility) with only                                                                               |                   | Dry          | Daylight               | Clear/Clear       | HIGHLAND AVE                                         | Local police  |
| 3776743                                                   | 12/23/2013 | Monday    | 1:01 PM    | NEEDHAM   | Non-fatal injury                    | 1                           | 0                        | Rear-end            | V1: Travelling straight ahead / V2:Slowing or stopped in traffic / V3:Slowing or stopped in traffic / V4:Slowing or stopped in traffic | V1:E / V2:E / V3:E / V4:E | V1:(Collision with motor vehicle in traffic) V2:(Collision with motor vehicle in traffic) V3:(Collision with motor vehicle in traffic) V4:(Collision with motor vehicle in traffic) | V1:(Single-unit truck (3-or-more axles)) V2:(Passenger car) V3:(Passenger car) V4:(Passenger car)                                                                       |                   | Wet          | Daylight               | Cloudy/Rain       | HIGHLAND AVENUE / HIGHLAND TERRACE                   | Local police  |
| 3994729                                                   | 9/7/2014   | Sunday    | 3:15 PM    | NEEDHAM   | Non-fatal injury                    | 1                           | 0                        | Angle               | V1: Turning left / V2:Travelling straight ahead                                                                                        | V1:E / V2:W               | V1:(Collision with motor vehicle in traffic) V2:(Collision with motor vehicle in traffic)                                                                                           | V1:(Passenger car) V2:(Light truck(van, mini-van, panel, pickup, sport utility) with only                                                                               |                   | Dry          | Daylight               | Clear/Clear       | HIGHLAND AVE.                                        | Local police  |
| 3994757                                                   | 10/8/2014  | Wednesday | 4:21 PM    | NEEDHAM   | Unknown                             | 0                           | 0                        | Angle               | V1: Entering traffic lane / V2:Overtaking/passing                                                                                      | V1:S / V2:W               | V1:(Collision with motor vehicle in traffic) V2:(Collision with motor vehicle in traffic)                                                                                           | V1:(Passenger car) V2:(Passenger car)                                                                                                                                   |                   | Dry          | Daylight               | Clear/Clear       | HIGHLAND AV / HIGHLAND TER                           | Local police  |
| 3994789                                                   | 8/6/2014   | Wednesday | 4:04 AM    | NEEDHAM   | Property damage only (none injured) | 0                           | 0                        | Sideswipe, opposite | V1: Parked                                                                                                                             | V1:8                      | V1:(Unknown)                                                                                                                                                                        | V1:(Passenger car)                                                                                                                                                      |                   | Dry          | Dark - lighted roadway | Clear             | HIGHLAND TERRACE                                     | Local police  |
| 3995617                                                   | 12/1/2014  | Monday    | 9:56 AM    | NEEDHAM   | Property damage only (none injured) | 0                           | 0                        | Rear-end            | V1: Travelling straight ahead / V2:Travelling straight ahead                                                                           | V1:N / V2:N               | V1:(Collision with motor vehicle in traffic) V2:(Collision with motor vehicle in traffic)                                                                                           | V1:(Passenger car) V2:(Passenger car)                                                                                                                                   |                   | Dry          | Daylight               | Clear/Clear       | HIGHLAND AVE / HIGHLAND TER                          | Local police  |
| 2697632                                                   | 1/12/2011  | Wednesday | 3:35 PM    | NEEDHAM   | Property damage only (none injured) | 0                           | 0                        | Rear-end            | V1: Travelling straight ahead / V2:Slowing or stopped in traffic / V3:Travelling straight ahead                                        | V1:N / V2:N / V3:S        | V1:(Collision with motor vehicle in traffic) V2:(Collision with motor vehicle in traffic) V3:(Collision with motor vehicle in traffic)                                              | V1:() V2:() V3:()                                                                                                                                                       |                   | Snow         | Daylight               | Snow              | HIGHLAND AVENUE / HIGHLAND TERRACE / HIGHLAND CIRCLE | Local police  |
| 2709658                                                   | 3/1/2011   | Tuesday   | 4:10 PM    | NEEDHAM   | Property damage only (none injured) | 0                           | 0                        | Angle               | V1: Travelling straight ahead / V2:Turning left                                                                                        | V1:S / V2:E               | V1:(Collision with motor vehicle in traffic) V2:(Collision with motor vehicle in traffic)                                                                                           | V1:() V2:(Passenger car)                                                                                                                                                |                   | Dry          | Daylight               | Clear             | HIGHLAND AVENUE                                      | Local police  |
| 4072822                                                   | 1/14/2015  | Wednesday | 5:30 AM    | NEEDHAM   | Non-fatal injury                    | 2                           | 0                        | Head-on             | V1: Turning left                                                                                                                       | V1:W                      | V1:(Collision with pedestrian)                                                                                                                                                      | V1:(Light truck(van, mini-van, panel, pickup, sport utility) with only four tires)                                                                                      | P2:Pedestrian     | Ice          | Dark - lighted roadway | Snow/Other        | HIGHLAND AVE / HIGHLAND TER.                         | Local police  |
| 4074533                                                   | 3/20/2015  | Friday    | 1:35 PM    | NEEDHAM   | Property damage only (none injured) | 0                           | 0                        | Rear-end            | V1: Travelling straight ahead / V2:Slowing or stopped in traffic / V3:Slowing or stopped in traffic                                    | V1:N / V2:N / V3:N        | V1:(Collision with motor vehicle in traffic) V2:(Collision with motor vehicle in traffic) V3:(Collision with motor vehicle in traffic)                                              | V1:(Passenger car) V2:(Passenger car) V3:(Passenger car)                                                                                                                |                   | Dry          | Daylight               | Clear             | HIGHLAND AVENUE / HIGHLAND TERRACE                   | Local police  |
| 4158671                                                   | 9/30/2015  | Wednesday | 3:12 PM    | NEEDHAM   | Property damage only (none injured) | 0                           | 0                        | Angle               | V1: Turning left / V2:Unknown / V3:Travelling straight ahead                                                                           | V1:S / V2:S / V3:S        | V1:(Collision with motor vehicle in traffic) V2:(Collision with motor vehicle in traffic) V3:(Collision with motor vehicle in traffic)                                              | V1:(Light truck(van, mini-van, panel, pickup, sport utility) with only four tires) V2:(Passenger car) V3:(Light truck(van, mini-van, panel, pickup, sport utility) with |                   | Wet          | Daylight               | Cloudy            | HIGHLAND AVE                                         | Local police  |
| 4173172                                                   | 12/17/2015 | Thursday  | 1:51 PM    | NEEDHAM   | Property damage only (none injured) | 0                           | 0                        | Angle               | V1: Turning right / V2:Travelling straight ahead                                                                                       | V1:E / V2:E               | V1:(Collision with motor vehicle in traffic) V2:(Collision with motor vehicle in traffic)                                                                                           | V1:(Passenger car) V2:(Light truck(van, mini-van, panel, pickup, sport utility) with only                                                                               |                   | Wet          | Daylight               | Rain/Cloudy       | HIGHLAND AVE                                         | Local police  |
| 4173193                                                   | 12/31/2015 | Thursday  | 12:26 PM   | NEEDHAM   | Property damage only (none injured) | 0                           | 0                        | Angle               | V1: Travelling straight ahead / V2:Turning left                                                                                        | V1:W / V2:N               | V1:(Collision with motor vehicle in traffic) V2:(Collision with motor vehicle in traffic)                                                                                           | V1:(Passenger car) V2:(Passenger car)                                                                                                                                   |                   | Dry          | Daylight               | Clear             | HIGHLAND AVE                                         | Local police  |
| 4173557                                                   | 12/28/2015 | Monday    | 2:43 PM    | NEEDHAM   | Property damage only (none injured) | 0                           | 0                        | Angle               | V1: Travelling straight ahead / V2:Entering traffic lane                                                                               | V1:S / V2:E               | V1:(Collision with motor vehicle in traffic) V2:(Collision with motor vehicle in traffic)                                                                                           | V1:(Light truck(van, mini-van, panel, pickup, sport utility) with only four tires) V2:(Passenger car)                                                                   |                   | Dry          | Daylight               | Clear             | HIGHLAND AVENUE                                      | Local police  |



| Crash Number                                         | Crash Date | Weekday   | Crash Time | City/Town | Crash Severity                      | Number of NonFatal Injuries | Number of Fatal Injuries | Manner of Collision           | Vehicle Action Prior to Crash                                                          | Vehicle Travel Directions | Most Harmful Events                                                                                                                    | Vehicle Configuration                                                                                                                                     | Non Motorist Type | Road Surface          | Ambient Light          | Weather Condition | Roadway                         | Police Agency |
|------------------------------------------------------|------------|-----------|------------|-----------|-------------------------------------|-----------------------------|--------------------------|-------------------------------|----------------------------------------------------------------------------------------|---------------------------|----------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------|-----------------------|------------------------|-------------------|---------------------------------|---------------|
| 22: Highland Avenue at 2nd Avenue / Staples Driveway |            |           |            |           |                                     |                             |                          |                               |                                                                                        |                           |                                                                                                                                        |                                                                                                                                                           |                   |                       |                        |                   |                                 |               |
| 2755906                                              | 7/20/2011  | Wednesday | 10:15 AM   | NEEDHAM   | Non-fatal injury                    | 1                           | 0                        | Rear-end                      | V1: Slowing or stopped in traffic / V2:Slowing or stopped in traffic / V3:Not reported | V1:8 / V2:8 / V3:8        | V1:(Collision with motor vehicle in traffic) V2:(Collision with motor vehicle in traffic) V3:()                                        | V1:(Passenger car) V2:() V3:()                                                                                                                            |                   | Dry                   | Daylight               | Clear             | HIGHLAND AVENUE / SECOND AVENUE | Local police  |
| 3244332                                              | 4/11/2012  | Wednesday | 10:00 PM   | NEEDHAM   | Property damage only (none injured) | 0                           | 0                        | Sideswipe, same direction     | V1: Turning right / V2:Travelling straight ahead                                       | V1:W / V2:W               | V1:(Collision with motor vehicle in traffic) V2:(Collision with motor vehicle in traffic)                                              | V1:(Light truck(van, mini-van, panel, pickup, sport utility) with only four tires) V2:(Light truck(van, mini-van, panel, pickup, sport utility) with only |                   | Dry                   | Dark - lighted roadway | Clear/Clear       | HIGHLAND AVENUE / SECOND AVENUE | Local police  |
| 3255848                                              | 6/4/2012   | Monday    | 12:56 PM   | NEEDHAM   | Property damage only (none injured) | 0                           | 0                        | Sideswipe, same direction     | V1: Travelling straight ahead / V2:Changing lanes                                      | V1:E / V2:E               | V1:(Collision with motor vehicle in traffic) V2:(Collision with motor vehicle in traffic)                                              | V1:(Passenger car) V2:(Passenger car)                                                                                                                     |                   | Wet                   | Daylight               | Rain/Rain         | HIGHLAND AVENUE / SECOND AVENUE | Local police  |
| 3396521                                              | 1/4/2013   | Friday    | 2:43 PM    | NEEDHAM   | Property damage only (none injured) | 0                           | 0                        | Sideswipe, same direction     | V1: Changing lanes / V2:Slowing or stopped in traffic                                  | V1:W / V2:W               | V1:(Collision with motor vehicle in traffic) V2:(Collision with motor vehicle in traffic)                                              | V1:(Single-unit truck (2-axle, 6-tire)) V2:(Passenger car)                                                                                                |                   | Dry                   | Daylight               | Clear             | SECOND AVENUE                   | Local police  |
| 2881650                                              | 9/18/2011  | Sunday    | 2:30 PM    | NEEDHAM   | Property damage only (none injured) | 0                           | 0                        | Rear-end                      | V1: Turning left / V2:Turning left                                                     | V1:N / V2:N               | V1:(Collision with motor vehicle in traffic) V2:(Collision with motor vehicle in traffic)                                              | V1:() V2:()                                                                                                                                               |                   | Dry                   | Daylight               | Clear             | HIGHLAND AVENUE / SECOND AVENUE | Local police  |
| 3288202                                              | 8/20/2012  | Monday    | 9:15 AM    | NEEDHAM   | Property damage only (none injured) | 0                           | 0                        | Sideswipe, same direction     | V1: Travelling straight ahead / V2:Travelling straight ahead                           | V1:8 / V2:8               | V1:() V2:()                                                                                                                            | V1:(Passenger car) V2:(Light truck(van, mini-van, panel, pickup, sport utility) with only                                                                 |                   | Dry                   | Daylight               | Clear             | HIGHLAND AVENUE / SECOND AVENUE | Local police  |
| 3475788                                              | 3/7/2013   | Thursday  | 7:24 AM    | NEEDHAM   | Property damage only (none injured) | 0                           | 0                        | Sideswipe, same direction     | V1: Overtaking/passing / V2:Turning right                                              | V1:8 / V2:8               | V1:(Collision with motor vehicle in traffic) V2:(Collision with motor vehicle in traffic)                                              | V1:(Passenger car) V2:(Passenger car)                                                                                                                     |                   | Wet                   | Daylight               | Cloudy/Rain       | SECOND AVENUE / HIGHLAND AVENUE | Local police  |
| 3475844                                              | 1/25/2013  | Friday    | 1:14 PM    | NEEDHAM   | Property damage only (none injured) | 0                           | 0                        | Rear-end                      | V1: Travelling straight ahead / V2:Slowing or stopped in traffic                       | V1:W / V2:N               | V1:(Collision with motor vehicle in traffic) V2:(Collision with motor vehicle in traffic)                                              | V1:(Light truck(van, mini-van, panel, pickup, sport utility) with only four tires) V2:(Light truck(van, mini-van, panel, pickup, sport utility) with only |                   | Dry                   | Daylight               | Clear/Clear       | HIGHLAND AV. / 2ND AV.          | Local police  |
| 3475848                                              | 1/6/2013   | Sunday    | 1:33 PM    | NEEDHAM   | Non-fatal injury                    | 1                           | 0                        | Rear-end                      | V1: Travelling straight ahead / V2:Slowing or stopped in traffic                       | V1:W / V2:W               | V1:(Collision with motor vehicle in traffic) V2:(Collision with motor vehicle in traffic)                                              | V1:(Passenger car) V2:(Light truck(van, mini-van, panel, pickup, sport utility) with only                                                                 |                   | Wet                   | Unknown                | Clear/Cloudy      | HIGHLAND AVENUE                 | Local police  |
| 3776737                                              | 10/24/2013 | Thursday  | 12:55 PM   | NEEDHAM   | Property damage only (none injured) | 0                           | 0                        | Sideswipe, same direction     | V1: Turning left / V2:Turning left                                                     | V1:W / V2:8               | V1:(Collision with motor vehicle in traffic) V2:(Collision with motor vehicle in traffic)                                              | V1:(Light truck(van, mini-van, panel, pickup, sport utility) with only four tires) V2:(Single-unit truck (2-axle, 6-tire))                                |                   | Dry                   | Daylight               | Clear/Clear       | SECOND AVENUE / HIGHLAND AVENUE | Local police  |
| 4072829                                              | 1/20/2015  | Tuesday   | 1:40 PM    | NEEDHAM   | Property damage only (none injured) | 0                           | 0                        | Angle                         | V1: Turning left / V2:Overtaking/passing                                               | V1:W / V2:E               | V1:(Collision with motor vehicle in traffic) V2:(Collision with motor vehicle in traffic)                                              | V1:(Passenger car) V2:(Passenger car)                                                                                                                     |                   | Dry                   | Daylight               | Clear             | HIGHLAND AVE / 2ND AVE          | Local police  |
| 4073341                                              | 2/20/2015  | Friday    | 3:22 PM    | NEEDHAM   | Property damage only (none injured) | 0                           | 0                        | Head-on                       | V1: Travelling straight ahead / V2:Travelling straight ahead                           | V1:E / V2:S               | V1:(Collision with motor vehicle in traffic) V2:(Collision with motor vehicle in traffic)                                              | V1:(Passenger car) V2:(Passenger car)                                                                                                                     |                   | Dry                   | Daylight               | Clear/Clear       | HIGHLAND AVE. / 2ND AVE.        | Local police  |
| 4075405                                              | 5/3/2015   | Sunday    | 6:28 PM    | NEEDHAM   | Property damage only (none injured) | 0                           | 0                        | Sideswipe, opposite direction | V1: Turning left / V2:Travelling straight ahead / V3:Turning left                      | V1:N / V2:S / V3:E        | V1:(Collision with motor vehicle in traffic) V2:(Collision with motor vehicle in traffic) V3:(Collision with motor vehicle in traffic) | V1:(Passenger car) V2:(Light truck(van, mini-van, panel, pickup, sport utility) with only four tires) V3:(Passenger car)                                  |                   | Dry                   | Daylight               | Clear/Clear       | HIGHLAND AVE / 2ND AVE          | Local police  |
| 2717517                                              | 4/2/2011   | Saturday  | 5:21 AM    | NEEDHAM   | Property damage only (none injured) | 0                           | 0                        | Single vehicle crash          | V1: Travelling straight ahead                                                          | V1:E                      | V1:(Collision with tree)                                                                                                               | V1:(Passenger car)                                                                                                                                        |                   | Sand, mud, dirt, oil, | Dark - lighted roadway | Clear             | SECOND AVENUE                   | Local police  |
| 2717522                                              | 3/11/2011  | Friday    | 4:45 PM    | NEEDHAM   | Not Reported                        | 0                           | 0                        | Sideswipe, same               | V1: Not reported / V2:Not reported                                                     | V1:N / V2:N               | V1:() V2:()                                                                                                                            | V1:(Tractor/semi-trailer) V2:(Passenger car)                                                                                                              |                   | Wet                   | Daylight               | Cloudy            | HIGHLAND AVENUE / SECOND AVENUE | Local police  |
| 3320332                                              | 8/10/2012  | Friday    | 1:16 PM    | NEEDHAM   | Property damage only (none injured) | 0                           | 0                        | Sideswipe, same direction     | V1: Travelling straight ahead / V2:Changing lanes                                      | V1:8 / V2:8               | V1:(Collision with motor vehicle in traffic) V2:(Collision with motor vehicle in traffic)                                              | V1:(Passenger car) V2:(Passenger car)                                                                                                                     |                   | Wet                   | Daylight               | Rain/Cloudy       | HIGHLAND AVENUE                 | Local police  |
| 3342188                                              | 7/18/2012  | Wednesday | 10:15 AM   | NEEDHAM   | Property damage only (none injured) | 0                           | 0                        | Angle                         | V1: Changing lanes                                                                     | V1:8                      | V1:()                                                                                                                                  | V1:(Passenger car)                                                                                                                                        |                   | Wet                   | Daylight               | Cloudy/Rain       | HIGHLAND AVENUE / SECOND AVENUE | Local police  |
| 3350094                                              | 10/17/2012 | Wednesday | 1:01 PM    | NEEDHAM   | Property damage only (none injured) | 0                           | 0                        | Rear-end                      | V1: Slowing or stopped in traffic / V2:Slowing or stopped in traffic                   | V1:E / V2:E               | V1:(Collision with motor vehicle in traffic) V2:(Collision with motor vehicle in traffic)                                              | V1:(Light truck(van, mini-van, panel, pickup, sport utility) with only                                                                                    |                   | Dry                   | Daylight               | Clear/Clear       | HIGHLAND AVENUE / SECOND AVENUE | Local police  |
| 2826893                                              | 9/21/2011  | Wednesday | 12:50 PM   | NEEDHAM   | Non-fatal injury                    | 1                           | 0                        | Rear-end                      | V1: Travelling straight ahead / V2:Slowing or stopped in traffic                       | V1:S / V2:S               | V1:(Collision with motor vehicle in traffic) V2:(Collision with motor vehicle in traffic)                                              | V1:(Tractor/semi-trailer) V2:(Passenger car)                                                                                                              |                   | Dry                   | Daylight               | Clear             | HIGHLAND AVENUE / SECOND AVENUE | Local police  |

| Crash Number                                         | Crash Date | Weekday   | Crash Time | City/Town | Crash Severity                      | Number of NonFatal Injuries | Number of Fatal Injuries | Manner of Collision       | Vehicle Action Prior to Crash                                        | Vehicle Travel Directions | Most Harmful Events                                                                       | Vehicle Configuration                                                                                                                                     | Non Motorist Type | Road Surface | Ambient Light          | Weather Condition | Roadway                          | Police Agency |
|------------------------------------------------------|------------|-----------|------------|-----------|-------------------------------------|-----------------------------|--------------------------|---------------------------|----------------------------------------------------------------------|---------------------------|-------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------|--------------|------------------------|-------------------|----------------------------------|---------------|
| 22: Highland Avenue at 2nd Avenue / Staples Driveway |            |           |            |           |                                     |                             |                          |                           |                                                                      |                           |                                                                                           |                                                                                                                                                           |                   |              |                        |                   |                                  |               |
| 3371737                                              | 12/5/2012  | Wednesday | 8:43 AM    | NEEDHAM   | Property damage only (none injured) | 0                           | 0                        | Angle                     | V1: Turning left / V2:Travelling straight ahead                      | V1:W / V2:S               | V1:(Collision with motor vehicle in traffic) V2:(Collision with motor vehicle in traffic) | V1:(Light truck(van, mini-van, panel, pickup, sport utility) with only four tires) V2:(Passenger car)                                                     |                   | Dry          | Dark - lighted roadway | Clear/Clear       | SECOND AVENUE                    | Local police  |
| 3616661                                              | 8/6/2013   | Tuesday   | 8:40 AM    | NEEDHAM   | Property damage only (none injured) | 0                           | 0                        | Angle                     | V1: Leaving traffic lane / V2:Entering traffic lane                  | V1:E / V2:W               | V1:(Collision with motor vehicle in traffic) V2:(Collision with motor vehicle in traffic) | V1:(Passenger car) V2:(Tractor/semi-trailer)                                                                                                              |                   | Snow         | Daylight               | Clear/Clear       | SECOND AVENUE                    | Local police  |
| 3616681                                              | 8/23/2013  | Friday    | 6:08 PM    | NEEDHAM   | Property damage only (none injured) | 0                           | 0                        | Angle                     | V1: Travelling straight ahead / V2:Turning right                     | V1:N / V2:W               | V1:(Collision with motor vehicle in traffic) V2:(Collision with motor vehicle in traffic) | V1:(Passenger car) V2:(Passenger car)                                                                                                                     |                   | Dry          | Daylight               | Clear/Clear       | HIGHLAND AVE / 2ND AVE           | Local police  |
| 3616710                                              | 10/9/2013  | Wednesday | 12:00 AM   | NEEDHAM   | Property damage only (none injured) | 0                           | 0                        | Sideswipe, same direction | V1: Changing lanes / V2:Travelling straight ahead                    | V1:W / V2:W               | V1:(Collision with motor vehicle in traffic) V2:(Collision with motor vehicle in traffic) | V1:(Passenger car) V2:(Passenger car)                                                                                                                     |                   | Dry          | Dusk                   | Clear             | HIGHLAND AV / 2ND AV             | Local police  |
| 3886504                                              | 2/12/2014  | Wednesday | 10:06 AM   | NEEDHAM   | Property damage only (none injured) | 0                           | 0                        | Sideswipe, same direction | V1: Travelling straight ahead / V2:Travelling straight ahead         | V1:N / V2:N               | V1:(Collision with motor vehicle in traffic) V2:(Collision with motor vehicle in traffic) | V1:(Truck/trailer) V2:(Passenger car)                                                                                                                     |                   | Dry          | Daylight               | Clear/Clear       | HIGHLAND AVENUE                  | Local police  |
| 4173155                                              | 11/2/2015  | Monday    | 9:34 AM    | NEEDHAM   | Property damage only (none injured) | 0                           | 0                        | Unknown                   | V1: Backing                                                          | V1:W                      | V1:(Collision with motor vehicle in traffic)                                              | V1:(Passenger car)                                                                                                                                        | P2:Pedestrian     | Dry          | Daylight               | Clear             | HIGHLAND AVE                     | Local police  |
| 4173205                                              | 12/4/2015  | Friday    | 11:37 AM   | NEEDHAM   | Not Reported                        | 0                           | 0                        | Rear-end                  | V1: Parked                                                           | V1:8                      | V1:(Collision with motor vehicle in traffic)                                              | V1:(Light truck(van, mini-van, panel, pickup, sport utility) with only four tires)                                                                        |                   | Dry          | Daylight               | Clear             | HIGHLAND AVE                     | Local police  |
| 23: Highland Avenue at Charles Street                |            |           |            |           |                                     |                             |                          |                           |                                                                      |                           |                                                                                           |                                                                                                                                                           |                   |              |                        |                   |                                  |               |
| 3244362                                              | 4/5/2012   | Thursday  | 5:44 PM    | NEEDHAM   | Property damage only (none injured) | 0                           | 0                        | Angle                     | V1: Travelling straight ahead / V2:Travelling straight ahead         | V1:W / V2:E               | V1:(Collision with motor vehicle in traffic) V2:(Collision with motor vehicle in traffic) | V1:(Passenger car) V2:(Passenger car)                                                                                                                     |                   | Dry          | Daylight               | Clear             | HIGHLAND AVENUE                  | Local police  |
| 3925506                                              | 6/24/2014  | Tuesday   | 9:25 PM    | NEEDHAM   | Property damage only (none injured) | 0                           | 0                        | Single vehicle crash      | V1: Parked                                                           | V1:8                      | V1:(Collision with other fixed object (wall, building, tunnel, etc.))                     | V1:(Passenger car)                                                                                                                                        |                   | Dry          | Unknown                | Clear/Clear       | HIGHLAND AVE                     | Local police  |
| 3336530                                              | 10/1/2012  | Monday    | 7:40 AM    | NEEDHAM   | Not Reported                        | 0                           | 0                        | Angle                     | V1: Not reported / V2:Not                                            | V1:8 / V2:8               | V1:() V2:()                                                                               | V1:(Passenger car) V2:(Passenger                                                                                                                          |                   | Dry          | Dark - lighted         | Clear             | HIGHLAND AVENUE / CHARLES        | Local police  |
| 3337007                                              | 9/10/2012  | Monday    | 6:50 PM    | NEEDHAM   | Property damage only (none injured) | 0                           | 0                        | Angle                     | V1: Turning left / V2:Travelling straight ahead                      | V1:8 / V2:8               | V1:() V2:()                                                                               | V1:(Unknown vehicle configuration) V2:(Unknown                                                                                                            |                   | Dry          | Dusk                   | Clear             | HIGHLAND AVENUE / CHARLES STREET | Local police  |
| 3994725                                              | 8/28/2014  | Thursday  | 12:12 PM   | NEEDHAM   | Property damage only (none injured) | 0                           | 0                        | Angle                     | V1: Backing / V2:Travelling straight ahead                           | V1:S / V2:W               | V1:(Collision with motor vehicle in traffic) V2:(Collision with motor vehicle in traffic) | V1:(Passenger car) V2:(Passenger car)                                                                                                                     |                   | Dry          | Daylight               | Clear/Clear       | HIGHLAND AVE                     | Local police  |
| 3545764                                              | 6/24/2013  | Monday    | 6:32 PM    | NEEDHAM   | Property damage only (none injured) | 0                           | 0                        | Angle                     | V1: Overtaking/passing / V2:Turning right                            | V1:8 / V2:8               | V1:(Collision with motor vehicle in traffic) V2:(Collision with motor vehicle in traffic) | V1:(Light truck(van, mini-van, panel, pickup, sport utility) with only four tires) V2:(Tractor/semi-                                                      |                   | Dry          | Daylight               | Cloudy/Clear      | CHARLES ST / HIGHLAND AVE        | Local police  |
| 3775151                                              | 9/22/2013  | Sunday    | 4:00 PM    | NEEDHAM   | Property damage only (none injured) | 0                           | 0                        | Rear-end                  | V1: Slowing or stopped in traffic / V2:Backing                       | V1:8 / V2:8               | V1:(Collision with motor vehicle in traffic) V2:(Collision with parked motor vehicle)     | V1:(Passenger car) V2:(Passenger car)                                                                                                                     |                   | Dry          | Daylight               | Clear/Clear       | HIGHLAND AVE                     | Local police  |
| 4078702                                              | 6/25/2015  | Thursday  | 1:38 PM    | NEEDHAM   | Non-fatal injury                    | 1                           | 0                        | Rear-end                  | V1: Slowing or stopped in traffic / V2:Slowing or stopped in traffic | V1:W / V2:W               | V1:(Collision with motor vehicle in traffic) V2:(Collision with motor vehicle in traffic) | V1:(Light truck(van, mini-van, panel, pickup, sport utility) with only four tires) V2:(Light truck(van, mini-van, panel, pickup, sport utility) with only |                   | Dry          | Daylight               | Clear             | HIGHLAND AVE                     | Local police  |
| 4078706                                              | 6/30/2015  | Tuesday   | 10:47 AM   | NEEDHAM   | Property damage only (none injured) | 0                           | 0                        | Rear-to-rear              | V1: Backing / V2:Backing                                             | V1:W / V2:E               | V1:(Collision with motor vehicle in traffic) V2:(Collision with motor vehicle in traffic) | V1:(Passenger car) V2:(Passenger car)                                                                                                                     |                   | Dry          | Daylight               | Clear             | HIGHLAND AVE                     | Local police  |
| 4173144                                              | 10/21/2015 | Wednesday | 9:15 AM    | NEEDHAM   | Non-fatal injury                    | 1                           | 0                        | Single vehicle crash      | V1: Turning right                                                    | V1:E                      | V1:(Collision with pedestrian)                                                            | V1:(Passenger car)                                                                                                                                        |                   | Dry          | Daylight               | Cloudy/Other      | HIGHLAND AVE                     | Local police  |
| 4173200                                              | 10/7/2015  | Wednesday | 12:31 PM   | NEEDHAM   | Non-fatal injury                    | 1                           | 0                        | Rear-end                  | V1: Travelling straight ahead / V2:Slowing or stopped in traffic     | V1:W / V2:W               | V1:(Collision with motor vehicle in traffic) V2:(Collision with motor vehicle in traffic) | V1:(Light truck(van, mini-van, panel, pickup, sport utility) with only four tires) V2:(Light truck(van, mini-van, panel, pickup, sport utility) with only |                   | Dry          | Daylight               | Clear             | HIGHLAND AVE                     | Local police  |

| Crash Number                          | Crash Date | Weekday   | Crash Time | City/Town | Crash Severity                      | Number of NonFatal Injuries | Number of Fatal Injuries | Manner of Collision       | Vehicle Action Prior to Crash                                                               | Vehicle Travel Directions | Most Harmful Events                                                                                                                    | Vehicle Configuration                                                                                                                                     | Non Motorist Type | Road Surface | Ambient Light          | Weather Condition | Roadway                          | Police Agency |
|---------------------------------------|------------|-----------|------------|-----------|-------------------------------------|-----------------------------|--------------------------|---------------------------|---------------------------------------------------------------------------------------------|---------------------------|----------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------|--------------|------------------------|-------------------|----------------------------------|---------------|
| 24: Highland Avenue at Wexford Street |            |           |            |           |                                     |                             |                          |                           |                                                                                             |                           |                                                                                                                                        |                                                                                                                                                           |                   |              |                        |                   |                                  |               |
| 2717526                               | 3/16/2011  | Wednesday | 6:50 PM    | NEEDHAM   | Property damage only (none injured) | 0                           | 0                        | Angle                     | V1: Turning left / V2:Travelling straight ahead                                             | V1:E / V2:W               | V1:(Collision with motor vehicle in traffic) V2:(Collision with motor vehicle in traffic)                                              | V1:() V2:(Passenger car)                                                                                                                                  |                   | Not reported | Dark - lighted roadway | Clear             | HIGHLAND AVENUE                  | Local police  |
| 2717633                               | 3/21/2011  | Monday    | 1:52 PM    | NEEDHAM   | Property damage only                | 0                           | 0                        | Angle                     | V1: Not reported / V2:Not                                                                   | V1:S / V2:W               | V1:() V2:()                                                                                                                            | V1:() V2:()                                                                                                                                               |                   | Wet          | Daylight               | Snow/Snow         | HIGHLAND AVENUE / WEXFORD        | Local police  |
| 2729429                               | 5/16/2011  | Monday    | 2:30 PM    | NEEDHAM   | Non-fatal injury                    | 2                           | 0                        | Angle                     | V1: Travelling straight ahead / V2:Travelling straight ahead / V3:Travelling straight ahead | V1:E / V2:N / V3:N        | V1:(Collision with motor vehicle in traffic) V2:(Collision with motor vehicle in traffic) V3:(Collision with motor vehicle in traffic) | V1:(Passenger car) V2:(Light truck(van, mini-van, panel, pickup, sport utility) with only four tires) V3:(Light truck(van, mini-van, panel, pickup, sport |                   | Dry          | Daylight               | Cloudy            | HIGHLAND AVENUE / WEXFORD STREET | Local police  |
| 2729681                               | 5/16/2011  | Monday    | 4:45 PM    | NEEDHAM   | Property damage only (none injured) | 0                           | 0                        | Rear-end                  | V1: Slowing or stopped in traffic / V2:Slowing or stopped in traffic                        | V1:8 / V2:8               | V1:() V2:()                                                                                                                            | V1:() V2:()                                                                                                                                               |                   | Wet          | Daylight               | Cloudy/Rain       | HIGHLAND AVENUE                  | Local police  |
| 2737834                               | 6/13/2011  | Monday    | 5:45 PM    | NEEDHAM   | Property damage only (none injured) | 0                           | 0                        | Sideswipe, same direction | V1: Travelling straight ahead / V2:Changing lanes                                           | V1:8 / V2:8               | V1:() V2:()                                                                                                                            | V1:(Passenger car) V2:(Light truck(van, mini-van, panel, pickup, sport utility) with only                                                                 |                   | Dry          | Daylight               | Cloudy            | HIGHLAND AVENUE                  | Local police  |
| 2738628                               | 6/16/2011  | Thursday  | 7:00 PM    | NEEDHAM   | Property damage only (none injured) | 0                           | 0                        | Angle                     | V1: Travelling straight ahead / V2:Turning left                                             | V1:S / V2:S               | V1:(Collision with motor vehicle in traffic) V2:(Collision with motor vehicle in traffic)                                              | V1:() V2:()                                                                                                                                               |                   | Dry          | Daylight               | Clear             | HIGHLAND AVENUE / WEXFORD STREET | Local police  |
| 2989477                               | 1/13/2012  | Friday    | 5:09 PM    | NEEDHAM   | Non-fatal injury                    | 2                           | 0                        | Angle                     | V1: Turning right / V2:Travelling straight ahead                                            | V1:E / V2:S               | V1:(Collision with motor vehicle in traffic) V2:(Collision with motor vehicle in traffic)                                              | V1:() V2:()                                                                                                                                               |                   | Dry          | Dusk                   | Clear             | HIGHLAND AVENUE / WEXFORD STREET | Local police  |
| 2989495                               | 1/9/2012   | Monday    | 12:20 PM   | NEEDHAM   | Property damage only (none injured) | 0                           | 0                        | Rear-end                  | V1: Slowing or stopped in traffic / V2:Travelling straight ahead                            | V1:E / V2:E               | V1:(Collision with motor vehicle in traffic) V2:(Collision with motor vehicle in traffic)                                              | V1:() V2:()                                                                                                                                               |                   | Dry          | Daylight               | Clear             | HIGHLAND AVENUE / WEXFORD STREET | Local police  |
| 3312239                               | 9/9/2012   | Sunday    | 10:35 AM   | NEEDHAM   | Property damage only (none injured) | 0                           | 0                        | Angle                     | V1: Turning right / V2:Travelling straight ahead                                            | V1:W / V2:W               | V1:(Collision with motor vehicle in traffic) V2:(Collision with motor vehicle in traffic)                                              | V1:(Passenger car) V2:(Passenger car)                                                                                                                     |                   | Dry          | Daylight               | Clear             | HIGHLAND AVENUE / WEXFORD STREET | Local police  |
| 3334205                               | 9/26/2012  | Wednesday | 11:48 AM   | NEEDHAM   | Property damage only (none injured) | 0                           | 0                        | Angle                     | V1: Turning left / V2:Travelling straight ahead                                             | V1:W / V2:S               | V1:(Collision with motor vehicle in traffic) V2:(Collision with motor vehicle in traffic)                                              | V1:(Light truck(van, mini-van, panel, pickup, sport utility) with only four tires) V2:(Light truck(van, mini-van, panel, pickup, sport utility) with only |                   | Dry          | Daylight               | Cloudy            | WEXFORD STREET                   | Local police  |
| 3336531                               | 10/1/2012  | Monday    | 9:19 AM    | NEEDHAM   | Property damage only (none injured) | 0                           | 0                        | Angle                     | V1: Travelling straight ahead / V2:Turning left                                             | V1:E / V2:E               | V1:(Collision with motor vehicle in traffic) V2:(Collision with motor vehicle in traffic)                                              | V1:(Light truck(van, mini-van, panel, pickup, sport utility) with only four tires) V2:(Passenger car)                                                     |                   | Dry          | Daylight               | Cloudy            | HIGHLAND AVENUE                  | Local police  |
| 3336534                               | 9/20/2012  | Thursday  | 5:06 PM    | NEEDHAM   | Non-fatal injury                    | 1                           | 0                        | Angle                     | V1: Travelling straight ahead / V2:Turning left                                             | V1:W / V2:E               | V1:(Collision with motor vehicle in traffic) V2:(Collision with motor vehicle in traffic)                                              | V1:(Unknown vehicle configuration) V2:(Unknown vehicle configuration)                                                                                     |                   | Dry          | Daylight               | Clear             | HIGHLAND AVENUE                  | Local police  |
| 3342362                               | 9/24/2012  | Monday    | 9:47 AM    | NEEDHAM   | Property damage only (none injured) | 0                           | 0                        | Angle                     | V1: Turning left / V2:Travelling straight ahead                                             | V1:W / V2:E               | V1:(Collision with motor vehicle in traffic) V2:(Collision with motor vehicle in traffic)                                              | V1:(Passenger car) V2:(Light truck(van, mini-van, panel, pickup, sport utility) with only                                                                 |                   | Dry          | Daylight               | Clear             | HIGHLAND AVENUE                  | Local police  |
| 3994750                               | 10/3/2014  | Friday    | 12:05 PM   | NEEDHAM   | Property damage only (none injured) | 0                           | 0                        | Angle                     | V1: Turning left / V2:Travelling straight ahead                                             | V1:W / V2:N               | V1:(Collision with motor vehicle in traffic) V2:(Collision with motor vehicle in traffic)                                              | V1:(Passenger car) V2:(Passenger car)                                                                                                                     |                   | Dry          | Daylight               | Cloudy/Cloudy     | HIGHLAND AVENUE / WEXFORD STREET | Local police  |
| 3994776                               | 10/29/2014 | Wednesday | 12:39 PM   | NEEDHAM   | Property damage only (none injured) | 0                           | 0                        | Angle                     | V1: Entering traffic lane / V2:Backing                                                      | V1:W / V2:S               | V1:(Collision with motor vehicle in traffic) V2:(Collision with motor vehicle in traffic)                                              | V1:(Passenger car) V2:(Passenger car)                                                                                                                     |                   | Dry          | Daylight               | Clear             | HIGHLAND AVENUE                  | Local police  |
| 3995604                               | 12/17/2014 | Wednesday | 5:47 PM    | NEEDHAM   | Property damage only (none injured) | 0                           | 0                        | Rear-end                  | V1: Travelling straight ahead / V2:Travelling straight ahead                                | V1:W / V2:W               | V1:(Collision with motor vehicle in traffic) V2:(Collision with motor vehicle in traffic)                                              | V1:(Light truck(van, mini-van, panel, pickup, sport utility) with only four tires) V2:(Passenger car)                                                     |                   | Dry          | Dark - lighted roadway | Clear/Clear       | HIGHLAND AVENUE / WEXFORD STREET | Local police  |
| 2712306                               | 2/18/2011  | Friday    | 12:39 PM   | NEEDHAM   | Property damage only (none injured) | 0                           | 0                        | Rear-end                  | V1: Slowing or stopped in traffic / V2:Travelling straight ahead                            | V1:8 / V2:8               | V1:(Collision with motor vehicle in traffic) V2:(Collision with motor vehicle in traffic)                                              | V1:(Passenger car) V2:(Light truck(van, mini-van, panel, pickup, sport utility) with only                                                                 |                   | Wet          | Daylight               | Cloudy            | HIGHLAND AVENUE / WEXFORD STREET | Local police  |
| 2881648                               | 9/16/2011  | Friday    | 9:38 AM    | NEEDHAM   | Property damage only (none injured) | 0                           | 0                        | Rear-end                  | V1: Backing / V2:Slowing or stopped in traffic                                              | V1:8 / V2:8               | V1:(Collision with motor vehicle in traffic) V2:(Collision with motor vehicle in traffic)                                              | V1:(Light truck(van, mini-van, panel, pickup, sport utility) with only four tires) V2:()                                                                  |                   | Dry          | Daylight               | Clear/Clear       | WEXFORD STREET / HIGHLAND AVENUE | Local police  |
| 3475768                               | 12/5/2012  | Wednesday | 10:04 AM   | NEEDHAM   | Property damage only (none injured) | 0                           | 0                        | Rear-end                  | V1: Slowing or stopped in traffic / V2:Slowing or stopped in traffic                        | V1:W / V2:8               | V1:(Collision with parked motor vehicle) V2:(Collision with parked motor vehicle)                                                      | V1:(Light truck(van, mini-van, panel, pickup, sport utility) with only                                                                                    |                   | Dry          | Daylight               | Clear             | HIGHLAND AVE                     | Local police  |
| 3475843                               | 6/20/2013  | Thursday  | 4:40 PM    | NEEDHAM   | Non-fatal injury                    | 1                           | 0                        | Sideswipe, same direction | V1: Changing lanes / V2:Travelling straight ahead / V3:Travelling straight ahead            | V1:E / V2:E / V3:N        | V1:(Collision with motor vehicle in traffic) V2:(Collision with motor vehicle in traffic) V3:(Collision with motor vehicle in traffic) | V1:(Passenger car) V2:(Passenger car) V3:(Passenger car)                                                                                                  |                   | Dry          | Daylight               | Clear/Clear       | HIGHLAND AV.                     | Local police  |

| Crash Number                          | Crash Date | Weekday   | Crash Time | City/Town | Crash Severity                      | Number of NonFatal Injuries | Number of Fatal Injuries | Manner of Collision       | Vehicle Action Prior to Crash                                                                       | Vehicle Travel Directions | Most Harmful Events                                                                                                                    | Vehicle Configuration                                                                                                                                     | Non Motorist Type | Road Surface | Ambient Light          | Weather Condition | Roadway                          | Police Agency |
|---------------------------------------|------------|-----------|------------|-----------|-------------------------------------|-----------------------------|--------------------------|---------------------------|-----------------------------------------------------------------------------------------------------|---------------------------|----------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------|--------------|------------------------|-------------------|----------------------------------|---------------|
| 24: Highland Avenue at Wexford Street |            |           |            |           |                                     |                             |                          |                           |                                                                                                     |                           |                                                                                                                                        |                                                                                                                                                           |                   |              |                        |                   |                                  |               |
| 3774414                               | 12/14/2013 | Saturday  | 11:25 AM   | NEEDHAM   | Property damage only (none injured) | 0                           | 0                        | Sideswipe, same direction | V1: Travelling straight ahead / V2:Travelling straight ahead                                        | V1:S / V2:S               | V1:(Collision with motor vehicle in traffic) V2:(Collision with motor vehicle in traffic)                                              | V1:(Light truck(van, mini-van, panel, pickup, sport utility) with only four tires) V2:(Passenger car)                                                     |                   | Dry          | Daylight               | Clear/Clear       | HIGHLAND AVE                     | Local police  |
| 3775150                               | 12/27/2013 | Friday    | 2:05 PM    | NEEDHAM   | Property damage only (none injured) | 0                           | 0                        | Angle                     | V1: Travelling straight ahead / V2:Turning left                                                     | V1:W / V2:S               | V1:(Collision with motor vehicle in traffic) V2:(Collision with motor vehicle in traffic)                                              | V1:(Passenger car) V2:(Passenger car)                                                                                                                     |                   | Dry          | Daylight               | Clear/Clear       | HIGHLAND AVENUE / WEXFORD STREET | Local police  |
| 4072812                               | 1/8/2015   | Thursday  | 7:15 AM    | NEEDHAM   | Non-fatal injury                    | 2                           | 0                        | Rear-end                  | V1: Travelling straight ahead / V2:Turning left                                                     | V1:E / V2:E               | V1:(Collision with motor vehicle in traffic) V2:(Collision with motor vehicle in traffic)                                              | V1:(Passenger car) V2:(Light truck(van, mini-van, panel, pickup, sport utility) with only                                                                 |                   | Dry          | Daylight               | Clear/Clear       | HIGHLAND AVENUE / WEXFORD STREET | Local police  |
| 4094727                               | 8/19/2015  | Wednesday | 11:49 AM   | NEEDHAM   | Property damage only (none injured) | 0                           | 0                        | Head-on                   | V1: Turning right / V2:Travelling straight ahead                                                    | V1:S / V2:W               | V1:(Collision with motor vehicle in traffic) V2:(Collision with motor vehicle in traffic)                                              | V1:(Passenger car) V2:(Passenger car)                                                                                                                     |                   | Dry          | Daylight               | Clear             | HIGHLAND AVE / WEXFORD ST        | Local police  |
| 4072834                               | 1/26/2015  | Monday    | 9:34 AM    | NEEDHAM   | Property damage only (none injured) | 0                           | 0                        | Rear-end                  | V1: Slowing or stopped in traffic / V2:Travelling straight ahead                                    | V1:N / V2:8               | V1:(Collision with motor vehicle in traffic) V2:(Collision with motor vehicle in traffic)                                              | V1:(Light truck(van, mini-van, panel, pickup, sport utility) with only four tires) V2:(Passenger car)                                                     |                   | Dry          | Daylight               | Clear             | HIGHLAND AVENUE                  | Local police  |
| 4074536                               | 3/22/2015  | Sunday    | 12:00 AM   | NEEDHAM   | Property damage only (none injured) | 0                           | 0                        | Sideswipe, same direction | V1: Travelling straight ahead / V2:Travelling straight ahead                                        | V1:E / V2:E               | V1:(Collision with motor vehicle in traffic) V2:(Collision with motor vehicle in traffic)                                              | V1:(Passenger car) V2:(Passenger car)                                                                                                                     |                   | Dry          | Unknown                | Clear/Clear       | HIGHLAND AVE                     | Local police  |
| 4074560                               | 4/21/2015  | Tuesday   | 4:36 PM    | NEEDHAM   | Property damage only (none injured) | 0                           | 0                        | Angle                     | V1: Turning right / V2:Travelling straight ahead                                                    | V1:W / V2:W               | V1:(Collision with motor vehicle in traffic) V2:(Collision with motor vehicle in traffic)                                              | V1:(Passenger car) V2:(Passenger car)                                                                                                                     |                   | Dry          | Daylight               | Clear/Clear       | HIGHLAND AVE                     | Local police  |
| 4075379                               | 5/15/2015  | Friday    | 12:43 PM   | NEEDHAM   | Property damage only (none injured) | 0                           | 0                        | Sideswipe, same direction | V1: Travelling straight ahead / V2:Slowing or stopped in traffic                                    | V1:8 / V2:8               | V1:(Collision with parked motor vehicle) V2:(Collision with motor vehicle in traffic)                                                  | V1:(Light truck(van, mini-van, panel, pickup, sport utility) with only four tires) V2:(Passenger car)                                                     |                   | Dry          | Daylight               | Clear             | HIGHLAND AVENUE                  | Local police  |
| 3414034                               | 1/31/2013  | Thursday  | 4:19 PM    | NEEDHAM   | Property damage only (none injured) | 0                           | 0                        | Rear-end                  | V1: Travelling straight ahead / V2:Slowing or stopped in traffic                                    |                           | V1:(Collision with motor vehicle in traffic) V2:(Collision with motor vehicle in traffic)                                              | V1:(Passenger car) V2:(Passenger car)                                                                                                                     |                   | Dry          | Dark - unknown roadway | Clear             | HIGHLAND AVENUE                  | Local police  |
| 3925453                               | 5/1/2014   | Thursday  | 1:38 PM    | NEEDHAM   | Property damage only (none injured) | 0                           | 0                        | Sideswipe, same direction | V1: Turning right / V2:Travelling straight ahead                                                    | V1:E / V2:E               | V1:(Collision with motor vehicle in traffic) V2:(Collision with motor vehicle in traffic)                                              | V1:(Light truck(van, mini-van, panel, pickup, sport utility) with only four tires) V2:(Light truck(van, mini-van, panel, pickup, sport utility) with only |                   | Dry          | Daylight               | Cloudy/Cloudy     | WEXFORD ST                       | Local police  |
| 3925459                               | 5/9/2014   | Friday    | 9:17 PM    | NEEDHAM   | Property damage only (none injured) | 0                           | 0                        | Rear-end                  | V1: Slowing or stopped in traffic / V2:Slowing or stopped in traffic / V3:Travelling straight ahead | V1:E / V2:E / V3:E        | V1:(Collision with motor vehicle in traffic) V2:(Collision with motor vehicle in traffic) V3:(Collision with motor vehicle in traffic) | V1:(Light truck(van, mini-van, panel, pickup, sport utility) with only four tires) V2:(Light truck(van, mini-van, panel, pickup, sport utility) with only |                   | Dry          | Dark - lighted roadway | Cloudy            | HIGHLAND AV                      | Local police  |
| 3616684                               | 8/28/2013  | Wednesday | 2:21 PM    | NEEDHAM   | Property damage only (none injured) | 0                           | 0                        | Angle                     | V1: Turning left / V2:Travelling straight ahead                                                     | V1:E / V2:S               | V1:(Collision with motor vehicle in traffic) V2:(Collision with motor vehicle in traffic)                                              | V1:(Light truck(van, mini-van, panel, pickup, sport utility) with only four tires) V2:(Passenger car)                                                     |                   | Dry          | Daylight               | Clear/Cloudy      | HIGHLAND AVE / WEXFORD ST        | Local police  |
| 3616731                               | 9/25/2013  | Wednesday | 5:21 PM    | NEEDHAM   | Property damage only (none injured) | 0                           | 0                        | Rear-end                  | V1: Parked / V2:Backing                                                                             | V1:8 / V2:8               | V1:(Collision with motor vehicle in traffic) V2:(Collision with parked motor vehicle)                                                  | V1:(Light truck(van, mini-van, panel, pickup, sport utility) with only four tires) V2:(Light truck(van, mini-van, panel, pickup, sport utility) with only |                   | Dry          | Daylight               | Clear             | WEXFORD STREET                   | Local police  |
| 3886123                               | 2/4/2014   | Tuesday   | 3:05 PM    | NEEDHAM   | Property damage only (none injured) | 0                           | 0                        | Angle                     | V1: Turning left / V2:Travelling straight ahead                                                     | V1:N / V2:S               | V1:(Collision with motor vehicle in traffic) V2:(Collision with motor vehicle in traffic)                                              | V1:(Passenger car) V2:(Passenger car)                                                                                                                     |                   | Dry          | Daylight               | Clear/Cloudy      | HIGHLAND AVE                     | Local police  |
| 4173137                               | 10/15/2015 | Thursday  | 1:23 PM    | NEEDHAM   | Property damage only (none injured) | 0                           | 0                        | Rear-end                  | V1: Travelling straight ahead / V2:Slowing or stopped in traffic / V3:Travelling straight ahead     | V1:N / V2:N / V3:N        | V1:(Collision with other movable object) V2:(Collision with other movable object) V3:(Collision with other movable object)             | V1:(Passenger car) V2:(Passenger car) V3:(Passenger car)                                                                                                  |                   | Dry          | Daylight               | Clear             | HIGHLAND AVE                     | Local police  |
| 4173166                               | 12/9/2015  | Wednesday | 8:04 AM    | NEEDHAM   | Property damage only (none injured) | 0                           | 0                        | Angle                     | V1: Turning left / V2:Travelling straight ahead                                                     | V1:N / V2:W               | V1:(Collision with motor vehicle in traffic) V2:(Collision with motor vehicle in traffic)                                              | V1:(Passenger car) V2:(Passenger car)                                                                                                                     |                   | Dry          | Daylight               | Clear             | WEXFORD ST                       | Local police  |
| 4173185                               | 12/22/2015 | Tuesday   | 9:16 AM    | NEEDHAM   | Property damage only (none injured) | 0                           | 0                        | Single vehicle crash      | V1: Slowing or stopped in traffic                                                                   | V1:8                      | V1:(Collision with motor vehicle in traffic)                                                                                           | V1:(Passenger car)                                                                                                                                        |                   | Wet          | Daylight               | Rain/Cloudy       | WEXFORD ST / HIGHLAND AVE        | Local police  |



| Crash Number                      | Crash Date | Weekday   | Crash Time | City/Town | Crash Severity                      | Number of NonFatal Injuries | Number of Fatal Injuries | Manner of Collision       | Vehicle Action Prior to Crash                                                                           | Vehicle Travel Directions | Most Harmful Events                                                                                                                    | Vehicle Configuration                                                                                                                                     | Non Motorist Type | Road Surface | Ambient Light | Weather Condition | Roadway                        | Police Agency |
|-----------------------------------|------------|-----------|------------|-----------|-------------------------------------|-----------------------------|--------------------------|---------------------------|---------------------------------------------------------------------------------------------------------|---------------------------|----------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------|--------------|---------------|-------------------|--------------------------------|---------------|
| 25: Highland Avenue at 1st Avenue |            |           |            |           |                                     |                             |                          |                           |                                                                                                         |                           |                                                                                                                                        |                                                                                                                                                           |                   |              |               |                   |                                |               |
| 3411947                           | 1/24/2013  | Thursday  | 1:26 PM    | NEEDHAM   | Non-fatal injury                    | 1                           | 0                        | Angle                     | V1: Travelling straight ahead / V2:Turning left                                                         | V1:E / V2:N               | V1:(Collision with motor vehicle in traffic) V2:(Collision with motor vehicle in traffic)                                              | V1:(Passenger car) V2:(Light truck(van, mini-van, panel, pickup, sport utility) with only                                                                 |                   | Wet          | Daylight      | Clear             | HIGHLAND AVE                   | Local police  |
| 3925466                           | 5/16/2014  | Friday    | 3:34 PM    | NEEDHAM   | Property damage only (none injured) | 0                           | 0                        | Rear-end                  | V1: Travelling straight ahead / V2:Slowing or stopped in traffic                                        | V1:N / V2:N               | V1:(Collision with motor vehicle in traffic) V2:(Collision with motor vehicle in traffic)                                              | V1:(Passenger car) V2:(Light truck(van, mini-van, panel, pickup, sport utility) with only                                                                 |                   | Dry          | Daylight      | Cloudy            | HIGHLAND AVE                   | Local police  |
| 2697647                           | 1/11/2011  | Tuesday   | 9:24 AM    | NEEDHAM   | Property damage only (none injured) | 0                           | 0                        | Sideswipe, same direction | V1: Travelling straight ahead / V2:Travelling straight ahead                                            | V1:W / V2:W               | V1:(Collision with motor vehicle in traffic) V2:(Collision with motor vehicle in traffic)                                              | V1:() V2:(Light truck(van, mini-van, panel, pickup, sport utility) with only four tires)                                                                  |                   | Dry          | Daylight      | Clear/Clear       | HIGHLAND AVENUE                | Local police  |
| 2705448                           | 2/24/2011  | Thursday  | 8:57 AM    | NEEDHAM   | Property damage only (none injured) | 0                           | 0                        | Rear-end                  | V1: Slowing or stopped in traffic / V2:Travelling straight ahead                                        | V1:N / V2:N               | V1:(Collision with motor vehicle in traffic) V2:(Collision with motor vehicle in traffic)                                              | V1:(Passenger car) V2:(Truck/trailer)                                                                                                                     |                   | Dry          | Daylight      | Clear/Clear       | FIRST AVENUE / HIGHLAND AVENUE | Local police  |
| 2706750                           | 1/20/2011  | Thursday  | 8:20 AM    | NEEDHAM   | Property damage only (none injured) | 0                           | 0                        | Sideswipe, same direction | V1: Changing lanes / V2:Travelling straight ahead                                                       | V1:E / V2:E               | V1:(Collision with motor vehicle in traffic) V2:(Collision with motor vehicle in traffic)                                              | V1:(Passenger car) V2:(Light truck(van, mini-van, panel, pickup, sport utility) with only                                                                 |                   | Dry          | Daylight      | Clear             | HIGHLAND AVENUE / FIRST AVENUE | Local police  |
| 2869738                           | 10/13/2011 | Thursday  | 12:16 PM   | NEEDHAM   | Property damage only (none injured) | 0                           | 0                        | Angle                     | V1: Travelling straight ahead / V2:Entering traffic lane                                                | V1:8 / V2:N               | V1:() V2:()                                                                                                                            | V1:(Light truck(van, mini-van, panel, pickup, sport utility) with only four tires) V2:(Light truck(van, mini-van, panel, pickup, sport utility) with only |                   | Wet          | Daylight      | Rain              | HIGHLAND AVENUE                | Local police  |
| 2881634                           | 9/23/2011  | Friday    | 12:31 PM   | NEEDHAM   | Non-fatal injury                    | 1                           | 0                        | Head-on                   | V1: Making U-turn / V2:Travelling straight ahead / V3:Slowing or stopped in traffic                     | V1:W / V2:W / V3:E        | V1:(Collision with motor vehicle in traffic) V2:(Collision with motor vehicle in traffic) V3:(Collision with motor vehicle in traffic) | V1:(Passenger car) V2:() V3:()                                                                                                                            |                   | Dry          | Daylight      | Cloudy/Cloudy     | HIGHLAND AVENUE                | Local police  |
| 2951747                           | 1/20/2012  | Friday    | 1:37 PM    | NEEDHAM   | Non-fatal injury                    | 2                           | 0                        | Sideswipe, same           | V1: Travelling straight ahead / V2:Not reported                                                         | V1:8 / V2:8               | V1:(Collision with parked motor vehicle) V2:()                                                                                         | V1:(Single-unit truck (2-axle, 6-tire)) V2:(Single-unit truck (2-axle,                                                                                    |                   | Dry          | Daylight      | Clear/Clear       | HIGHLAND AVENUE                | Local police  |
| 3285546                           | 7/15/2012  | Sunday    | 3:52 PM    | NEEDHAM   | Property damage only (none injured) | 0                           | 0                        | Angle                     | V1: Turning left / V2:Turning right                                                                     | V1:8 / V2:8               | V1:(Collision with motor vehicle in traffic) V2:(Collision with motor vehicle in traffic)                                              | V1:(Light truck(van, mini-van, panel, pickup, sport utility) with only four tires) V2:(Light truck(van, mini-van, panel, pickup, sport utility) with only |                   | Dry          | Daylight      | Clear             | HIGHLAND AVENUE                | Local police  |
| 3475676                           | 4/5/2013   | Friday    | 1:05 PM    | NEEDHAM   | Property damage only (none injured) | 0                           | 0                        | Rear-end                  | V1: Travelling straight ahead / V2:Slowing or stopped in traffic                                        | V1:8 / V2:8               | V1:(Collision with motor vehicle in traffic) V2:(Collision with motor vehicle in traffic)                                              | V1:(Light truck(van, mini-van, panel, pickup, sport utility) with only four tires) V2:(Light truck(van, mini-van, panel, pickup, sport utility) with only |                   | Dry          | Daylight      | Clear             | 1ST AVE / HIGHLAND AVE         | Local police  |
| 3774380                           | 11/5/2013  | Tuesday   | 11:25 AM   | NEEDHAM   | Property damage only (none injured) | 0                           | 0                        | Rear-end                  | V1: Travelling straight ahead / V2:Slowing or stopped in traffic                                        | V1:S / V2:S               | V1:(Collision with motor vehicle in traffic) V2:(Collision with motor vehicle in traffic)                                              | V1:(Light truck(van, mini-van, panel, pickup, sport utility) with only four tires) V2:(Light truck(van, mini-van, panel, pickup, sport utility) with only |                   | Dry          | Daylight      | Clear             | HIGHLAND AVENUE                | Local police  |
| 3774385                           | 11/12/2013 | Tuesday   | 11:33 AM   | NEEDHAM   | Property damage only (none injured) | 0                           | 0                        | Angle                     | V1: Slowing or stopped in traffic / V2:Turning right                                                    | V1:W / V2:W               | V1:(Collision with motor vehicle in traffic) V2:(Collision with motor vehicle in traffic)                                              | V1:(Passenger car) V2:(Tractor/semi-trailer)                                                                                                              |                   | Dry          | Daylight      | Cloudy/Cloudy     | 1ST. AVE / HIGHLAND AVE.       | Local police  |
| 3774397                           | 12/3/2013  | Tuesday   | 1:48 PM    | NEEDHAM   | Property damage only (none injured) | 0                           | 0                        | Angle                     | V1: Changing lanes / V2:Travelling straight ahead                                                       | V1:S / V2:S               | V1:(Collision with motor vehicle in traffic) V2:(Collision with motor vehicle in traffic)                                              | V1:(Light truck(van, mini-van, panel, pickup, sport utility) with only four tires) V2:(Passenger car)                                                     |                   | Dry          | Daylight      | Clear/Clear       | HIGHLAND AVE / 1ST AVE         | Local police  |
| 3775140                           | 10/28/2013 | Monday    | 1:38 PM    | NEEDHAM   | Property damage only (none injured) | 0                           | 0                        | Rear-end                  | V1: Slowing or stopped in traffic / V2:Travelling straight ahead                                        | V1:W / V2:W               | V1:(Collision with motor vehicle in traffic) V2:(Collision with motor vehicle in traffic)                                              | V1:(Light truck(van, mini-van, panel, pickup, sport utility) with only four tires) V2:(Passenger car)                                                     |                   | Dry          | Daylight      | Clear/Clear       | HIGHLAND AVENUE                | Local police  |
| 4078703                           | 6/25/2015  | Thursday  | 4:06 PM    | NEEDHAM   | Property damage only (none injured) | 0                           | 0                        | Sideswipe, same direction | V1: Slowing or stopped in traffic / V2:Travelling straight ahead                                        | V1:W / V2:W               | V1:(Collision with motor vehicle in traffic) V2:(Collision with motor vehicle in traffic)                                              | V1:(Passenger car) V2:(Passenger car)                                                                                                                     |                   | Dry          | Daylight      | Clear/Other       | HIGHLAND AVE                   | Local police  |
| 2717946                           | 3/28/2011  | Monday    | 7:25 AM    | NEEDHAM   | Property damage only                | 0                           | 0                        | Single vehicle            | V1: Turning right                                                                                       | V1:8                      | V1:(Collision with pedestrian)                                                                                                         | V1:()                                                                                                                                                     | P2:Pedestrian     | Dry          | Daylight      | Clear             | HIGHLAND AVENUE / FIRST        | Local police  |
| 2739633                           | 6/10/2011  | Friday    | 12:00 PM   | NEEDHAM   | Property damage only (none injured) | 0                           | 0                        | Single vehicle crash      | V1: Travelling straight ahead / V2:Travelling straight ahead                                            | V1:8 / V2:8               | V1:() V2:()                                                                                                                            | V1:(Unknown heavy truck, cannot classify) V2:(Passenger car)                                                                                              |                   | Dry          | Daylight      | Cloudy            | HIGHLAND AVENUE                | Local police  |
| 3061084                           | 2/10/2012  | Friday    | 1:30 PM    | NEEDHAM   | Property damage only (none injured) | 0                           | 0                        | Rear-end                  | V1: Slowing or stopped in traffic / V2:Slowing or stopped in traffic / V3:Slowing or stopped in traffic | V1:8 / V2:8 / V3:8        | V1:(Collision with motor vehicle in traffic) V2:() V3:()                                                                               | V1:() V2:(Passenger car) V3:(Passenger car)                                                                                                               |                   | Dry          | Daylight      | Clear             | HIGHLAND AVENUE                | Local police  |
| 3342195                           | 7/11/2012  | Wednesday | 12:53 PM   | NEEDHAM   | Property damage only (none injured) | 0                           | 0                        | Sideswipe, same direction | V1: Travelling straight ahead / V2:Changing lanes                                                       | V1:S / V2:S               | V1:(Collision with motor vehicle in traffic) V2:(Collision with motor vehicle in traffic)                                              | V1:(Passenger car) V2:(Light truck(van, mini-van, panel, pickup, sport utility) with only                                                                 |                   | Dry          | Daylight      | Clear             | HIGHLAND AVENUE                | Local police  |
| 3993661                           | 7/23/2014  | Wednesday | 5:34 PM    | NEEDHAM   | Non-fatal injury                    | 2                           | 0                        | Rear-end                  | V1: Travelling straight ahead / V2:Travelling straight ahead                                            | V1:W / V2:W               | V1:(Collision with motor vehicle in traffic) V2:(Collision with motor vehicle in traffic)                                              | V1:(Passenger car) V2:(Passenger car)                                                                                                                     |                   | Snow         | Daylight      | Clear             | HIGHLAND AVENUE                | Local police  |

| Crash Number                      | Crash Date | Weekday   | Crash Time | City/Town | Crash Severity                      | Number of NonFatal Injuries | Number of Fatal Injuries | Manner of Collision       | Vehicle Action Prior to Crash                                                                       | Vehicle Travel Directions | Most Harmful Events                                                                                                                    | Vehicle Configuration                                                                                                                                     | Non Motorist Type | Road Surface | Ambient Light              | Weather Condition | Roadway                        | Police Agency |
|-----------------------------------|------------|-----------|------------|-----------|-------------------------------------|-----------------------------|--------------------------|---------------------------|-----------------------------------------------------------------------------------------------------|---------------------------|----------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------|--------------|----------------------------|-------------------|--------------------------------|---------------|
| 25: Highland Avenue at 1st Avenue |            |           |            |           |                                     |                             |                          |                           |                                                                                                     |                           |                                                                                                                                        |                                                                                                                                                           |                   |              |                            |                   |                                |               |
| 3993675                           | 8/7/2014   | Thursday  | 3:21 PM    | NEEDHAM   | Property damage only (none injured) | 0                           | 0                        | Rear-end                  | V1: Travelling straight ahead / V2:Slowing or stopped in traffic                                    | V1:E / V2:W               | V1:(Collision with motor vehicle in traffic) V2:(Collision with motor vehicle in traffic)                                              | V1:(Passenger car) V2:(Light truck(van, mini-van, panel, pickup, sport utility) with only                                                                 |                   | Dry          | Daylight                   | Clear/Clear       | HIGHLAND AVE / 1ST AVE         | Local police  |
| 3994723                           | 8/22/2014  | Friday    | 12:03 PM   | NEEDHAM   | Property damage only (none injured) | 0                           | 0                        | Head-on                   | V1: Slowing or stopped in traffic                                                                   | V1:N                      | V1:(Collision with other fixed object (wall, building, tunnel, etc.))                                                                  | V1:(Passenger car)                                                                                                                                        |                   | Dry          | Dark - unknown             | Cloudy            | HIGHLAND AVE                   | Local police  |
| 3995142                           | 10/1/2014  | Wednesday | 10:13 AM   | NEEDHAM   | Non-fatal injury                    | 1                           | 0                        | Angle                     | V1: Turning right / V2:Turning right                                                                | V1:E / V2:E               | V1:(Collision with motor vehicle in traffic) V2:(Collision with motor vehicle in traffic)                                              | V1:(Passenger car) V2:(Tractor/semi-trailer)                                                                                                              |                   | Wet          | Daylight                   | Cloudy/Rain       | FIRST AVENUE / HIGHLAND AVENUE | Local police  |
| 3995603                           | 12/17/2014 | Wednesday | 11:53 AM   | NEEDHAM   | Property damage only (none injured) | 0                           | 0                        | Rear-end                  | V1: Travelling straight ahead / V2:Slowing or stopped in traffic                                    | V1:E / V2:E               | V1:(Collision with motor vehicle in traffic) V2:(Collision with motor vehicle in traffic)                                              | V1:(Single-unit truck (3-or-more axles)) V2:(Passenger car)                                                                                               |                   | Dry          | Daylight                   | Cloudy/Cloudy     | HIGHLAND AVENUE / FIRST AVENUE | Local police  |
| 3995615                           | 11/24/2014 | Monday    | 12:00 PM   | NEEDHAM   | Property damage only (none injured) | 0                           | 0                        | Angle                     | V1: Entering traffic lane / V2:Travelling straight ahead                                            | V1:E / V2:E               | V1:(Collision with motor vehicle in traffic) V2:(Collision with motor vehicle in traffic)                                              | V1:(Light truck(van, mini-van, panel, pickup, sport utility) with only four tires) V2:(Passenger car)                                                     |                   | Wet          | Dark - roadway not lighted | Rain              | HIGHLAND AVE / FIRST AVE       | Local police  |
| 4095260                           | 8/4/2015   | Tuesday   | 9:48 AM    | NEEDHAM   | Property damage only (none injured) | 0                           | 0                        | Sideswipe, same direction | V1: Slowing or stopped in traffic / V2:Travelling straight ahead                                    | V1:E / V2:E               | V1:(Collision with motor vehicle in traffic) V2:(Collision with motor vehicle in traffic)                                              | V1:(Passenger car) V2:(Light truck(van, mini-van, panel, pickup, sport utility) with only                                                                 |                   | Dry          | Daylight                   | Clear/Cloudy      | HIGHLAND AVENUE Rte 95         | Local police  |
| 3616663                           | 8/7/2013   | Wednesday | 5:19 PM    | NEEDHAM   | Non-fatal injury                    | 1                           | 0                        | Rear-end                  | V1: Travelling straight ahead / V2:Slowing or stopped in traffic / V3:Slowing or stopped in traffic | V1:W / V2:W / V3:W        | V1:(Collision with motor vehicle in traffic) V2:(Collision with motor vehicle in traffic) V3:(Collision with motor vehicle in traffic) | V1:(Light truck(van, mini-van, panel, pickup, sport utility) with only four tires) V2:(Light truck(van, mini-van, panel, pickup, sport utility) with only |                   | Dry          | Daylight                   | Clear/Clear       | HIGHLAND AVE                   | Local police  |
| 3861845                           | 12/30/2013 | Monday    | 5:51 PM    | NEEDHAM   | Property damage only (none injured) | 0                           | 0                        | Angle                     | V1: Slowing or stopped in traffic / V2:Travelling straight ahead                                    | V1:N / V2:N               | V1:(Collision with motor vehicle in traffic) V2:(Collision with motor vehicle in traffic)                                              | V1:(Passenger car) V2:(Passenger car)                                                                                                                     |                   | Dry          | Dark - roadway not lighted | Clear/Clear       | 1ST AVENUE / HIGHLAND AVENUE   | Local police  |
| 3861848                           | 1/10/2014  | Friday    | 1:10 PM    | NEEDHAM   | Property damage only (none injured) | 0                           | 0                        | Sideswipe, same direction | V1: Slowing or stopped in traffic / V2:Turning right                                                | V1:N / V2:N               | V1:(Collision with motor vehicle in traffic) V2:(Collision with motor vehicle in traffic)                                              | V1:(Passenger car) V2:(Passenger car)                                                                                                                     |                   | Wet          | Daylight                   | Cloudy            | 1ST AVE / HIGHLAND AVE         | Local police  |
| 3861862                           | 1/24/2014  | Friday    | 8:04 AM    | NEEDHAM   | Property damage only (none injured) | 0                           | 0                        | Angle                     | V1: Travelling straight ahead / V2:Turning left                                                     | V1:W / V2:8               | V1:(Collision with motor vehicle in traffic) V2:(Collision with motor vehicle in traffic)                                              | V1:(Light truck(van, mini-van, panel, pickup, sport utility) with only four tires) V2:(Light truck(van, mini-van, panel, pickup, sport utility) with only |                   | Dry          | Daylight                   | Clear/Clear       | HIGHLAND AVE                   | Local police  |
| 3861955                           | 1/10/2014  | Friday    | 4:53 PM    | NEEDHAM   | Property damage only (none injured) | 0                           | 0                        | Sideswipe, same direction | V1: Turning right / V2:Turning right                                                                | V1:W / V2:8               | V1:(Collision with motor vehicle in traffic) V2:(Collision with motor vehicle in traffic)                                              | V1:(Passenger car) V2:(Tractor/semi-trailer)                                                                                                              |                   | Wet          | Dark - lighted roadway     | Cloudy/Cloudy     | FIRST AVENUE / HIGHLAND AVENUE | Local police  |
| 3900356                           | 4/28/2014  | Monday    | 12:11 PM   | NEEDHAM   | Property damage only (none injured) | 0                           | 0                        | Rear-end                  | V1: Travelling straight ahead / V2:Travelling straight ahead                                        | V1:S / V2:S               | V1:(Collision with motor vehicle in traffic) V2:(Collision with motor vehicle in traffic)                                              | V1:(Light truck(van, mini-van, panel, pickup, sport utility) with only four tires) V2:(Light truck(van, mini-van, panel, pickup, sport utility) with only |                   | Dry          | Daylight                   | Clear/Clear       | HIGHLAND AVE                   | Local police  |
| 4173180                           | 11/16/2015 | Monday    | 3:10 PM    | NEEDHAM   | Property damage only (none injured) | 0                           | 0                        | Rear-end                  | V1: Parked / V2:Travelling straight ahead                                                           | V1:8 / V2:S               | V1:(Collision with motor vehicle in traffic) V2:(Collision with parked motor vehicle)                                                  | V1:(Unknown heavy truck, cannot classify) V2:(Light truck(van, mini-van, panel, pickup, sport utility) with only four tires)                              |                   | Dry          | Daylight                   | Clear             | HIGHLAND AVE                   | Local police  |
| 4173558                           | 11/24/2015 | Tuesday   | 6:50 PM    | NEEDHAM   | Property damage only (none injured) | 0                           | 0                        | Angle                     | V1: Travelling straight ahead / V2:Turning right                                                    | V1:E / V2:N               | V1:(Collision with motor vehicle in traffic) V2:(Collision with motor vehicle in traffic)                                              | V1:(Passenger car) V2:(Truck/trailer)                                                                                                                     |                   | Dry          | Dark - lighted roadway     | Clear             | HIGHLAND AVENUE / FIRST AVENUE | Local police  |

| Crash Number                         | Crash Date | Weekday | Crash Time | City/Town | Crash Severity                      | Number of NonFatal Injuries | Number of Fatal Injuries | Manner of Collision | Vehicle Action Prior to Crash                                                                                                          | Vehicle Travel Directions | Most Harmful Events                                                                                                                                                                 | Vehicle Configuration                                                                                                                                                                                                     | Non Motorist Type | Road Surface | Ambient Light          | Weather Condition | Roadway                                                | Police Agency |
|--------------------------------------|------------|---------|------------|-----------|-------------------------------------|-----------------------------|--------------------------|---------------------|----------------------------------------------------------------------------------------------------------------------------------------|---------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------|--------------|------------------------|-------------------|--------------------------------------------------------|---------------|
| 26: Highland Avenue at I-95 NB Ramps |            |         |            |           |                                     |                             |                          |                     |                                                                                                                                        |                           |                                                                                                                                                                                     |                                                                                                                                                                                                                           |                   |              |                        |                   |                                                        |               |
| 2712299                              | 2/24/2011  | Thu     | 7:34 AM    | NEEDHAM   | Property damage only (none injured) | 0                           | 0                        | Rear-end            | V1: Slowing or stopped in traffic / V2:Travelling straight ahead                                                                       | V1:N / V2:N               | V1:(Collision with motor vehicle in traffic) V2:(Collision with motor vehicle in traffic)                                                                                           | V1:(Light truck(van, mini-van, panel, pickup, sport utility) with only four tires) V2:(Passenger car)                                                                                                                     |                   | Dry          | Daylight               | Clear             | HIGHLAND AVENUE                                        | Local police  |
| 2725027                              | 4/27/2011  | Wed     | 5:32 PM    | NEEDHAM   | Non-fatal injury                    | 1                           | 0                        | Rear-end            | V1: Travelling straight ahead / V2:Slowing or stopped in traffic                                                                       | V1:N / V2:N               | V1:(Collision with motor vehicle in traffic) V2:(Collision with motor vehicle in traffic)                                                                                           | V1:(Passenger car) V2:(Light truck(van, mini-van, panel, pickup, sport utility) with only                                                                                                                                 |                   | Dry          | Daylight               | Clear/Cloudy      | Rte 95 / HIGHLAND AVENUE                               | Local police  |
| 3248277                              | 3/12/2012  | Mon     | 10:04 AM   | NEEDHAM   | Not Reported                        | 0                           | 0                        | Not reported        | V1: Not reported / V2:Not reported                                                                                                     | V1:8 / V2:8               | V2:                                                                                                                                                                                 | V1:(Light truck(van, mini-van, panel, pickup, sport utility) with only four tires) V2:(Light truck(van, mini-van, panel, pickup, sport utility) with only                                                                 |                   | Not reported | Not reported           | Not Reported      | Rte 95 / HIGHLAND AVENUE                               | Local police  |
| 3616698                              | 9/18/2013  | Wed     | 5:45 PM    | NEEDHAM   | Property damage only (none injured) | 0                           | 0                        | Rear-end            | V1: Slowing or stopped in traffic / V2:Slowing or stopped in traffic / V3:Slowing or stopped in traffic / V4:Travelling straight ahead | V1:N / V2:N / V3:N / V4:8 | V1:(Collision with motor vehicle in traffic) V2:(Collision with motor vehicle in traffic) V3:(Collision with motor vehicle in traffic) V4:(Collision with motor vehicle in traffic) | V1:(Light truck(van, mini-van, panel, pickup, sport utility) with only four tires) V2:(Passenger car) V3:(Light truck(van, mini-van, panel, pickup, sport utility) with only four tires) V4:(Passenger car)               |                   | Dry          | Daylight               | Clear/Clear       | HIGHLAND AVENUE / RAMP-HIGHLAND AVE NB TO RT 95 NB     | Local police  |
| 3336532                              | 10/1/2012  | Mon     | 8:20 AM    | NEEDHAM   | Property damage only (none injured) | 0                           | 0                        | Rear-end            | V1: Slowing or stopped in traffic / V2:Slowing or stopped in traffic / V3:Slowing or stopped in traffic                                | V1:N / V2:N / V3:N        | V1:(Collision with motor vehicle in traffic) V2:(Collision with motor vehicle in traffic) V3:(Collision with motor vehicle in traffic)                                              | V1:(Unknown vehicle configuration) V2:(Passenger car) V3:(Passenger car)                                                                                                                                                  |                   | Dry          | Daylight               | Clear             | HIGHLAND AVENUE Rte 95                                 | Local police  |
| 3342158                              | 7/29/2012  | Sun     | 5:09 PM    | NEEDHAM   | Property damage only (none injured) | 0                           | 0                        | Rear-end            | V1: Slowing or stopped in traffic                                                                                                      | V1:N                      | V1:(Collision with motor vehicle in traffic)                                                                                                                                        | V1:(Light truck(van, mini-van, panel, pickup, sport utility) with only four tires)                                                                                                                                        |                   | Dry          | Daylight               | Clear             | Rte 95 N / HIGHLAND AVENUE                             | Local police  |
| 2755686                              | 7/18/2011  | Mon     | 9:00 AM    | NEEDHAM   | Property damage only (none injured) | 0                           | 0                        | Angle               | V1: Entering traffic lane / V2:Travelling straight ahead                                                                               | V1:W / V2:W               | V1:(Collision with motor vehicle in traffic) V2:(Collision with motor vehicle in traffic)                                                                                           | V1:(Passenger car) V2:(Passenger car)                                                                                                                                                                                     |                   | Dry          | Daylight               | Clear             | HIGHLAND AVENUE                                        | Local police  |
| 2755903                              | 6/25/2011  | Sat     | 11:43 AM   | NEEDHAM   | Property damage only (none injured) | 0                           | 0                        | Rear-end            | V1: Slowing or stopped in traffic / V2:Travelling straight ahead                                                                       | V1:N / V2:N               | V1:(Collision with motor vehicle in traffic) V2:(Collision with motor vehicle in traffic)                                                                                           | V1:(Light truck(van, mini-van, panel, pickup, sport utility) with only four tires) V2:(Light truck(van, mini-van, panel, pickup, sport utility) with only                                                                 |                   | Dry          | Daylight               | Cloudy/Cloudy     | HIGHLAND AVENUE / Rte 95                               | Local police  |
| 3342191                              | 7/14/2012  | Sat     | 9:15 AM    | NEEDHAM   | Property damage only (none injured) | 0                           | 0                        | Rear-end            | V1: Entering traffic lane / V2:Entering traffic lane                                                                                   | V1:N / V2:N               | V1:(Collision with motor vehicle in traffic) V2:(Collision with motor vehicle in traffic)                                                                                           | V1:(Light truck(van, mini-van, panel, pickup, sport utility) with only                                                                                                                                                    |                   | Dry          | Daylight               | Clear             | HIGHLAND AVENUE / Rte 95 N                             | Local police  |
| 3364670                              | 11/16/2012 | Fri     | 8:50 AM    | NEEDHAM   | Non-fatal injury                    | 1                           | 0                        | Rear-end            | V1: Slowing or stopped in traffic / V2:Travelling straight ahead / V3:Travelling straight ahead                                        | V1:E / V2:E / V3:E        | V1:(Collision with motor vehicle in traffic) V2:(Collision with motor vehicle in traffic) V3:(Collision with motor vehicle in traffic)                                              | V1:(Light truck(van, mini-van, panel, pickup, sport utility) with only four tires) V2:(Light truck(van, mini-van, panel, pickup, sport utility) with only four tires) V3:(Light truck(van, mini-van, panel, pickup, sport |                   | Dry          | Daylight               | Clear             | HIGHLAND AVENUE / Rte 95                               | Local police  |
| 3365072                              | 11/1/2012  | Thu     | 6:10 PM    | NEEDHAM   | Property damage only (none injured) | 0                           | 0                        | Rear-end            | V1: Travelling straight ahead / V2:Slowing or stopped in traffic / V3:Slowing or stopped in traffic                                    | V1:E / V2:E / V3:E        | V1:(Collision with motor vehicle in traffic) V2:(Collision with motor vehicle in traffic) V3:(Collision with motor vehicle in traffic)                                              | V1:(Passenger car) V2:(Passenger car) V3:(Passenger car)                                                                                                                                                                  |                   | Dry          | Dark - lighted roadway | Clear             | HIGHLAND AVENUE / Rte 95                               | Local police  |
| 3396518                              | 2/4/2013   | Mon     | 10:00 AM   | NEEDHAM   | Non-fatal injury                    | 1                           | 0                        | Rear-end            | V1: Entering traffic lane / V2:Entering traffic lane                                                                                   | V1:N / V2:8               | V1:(Collision with motor vehicle in traffic) V2:(Collision with motor vehicle in traffic)                                                                                           | V1:(Light truck(van, mini-van, panel, pickup, sport utility) with only four tires) V2:(Unknown heavy truck, cannot classify)                                                                                              |                   | Dry          | Dark - lighted roadway | Cloudy/Cloudy     | HIGHLAND AVENUE / RAMP-RT 95 NB TO HIGHLAND AVE NB     | Local police  |
| 3413283                              | 1/24/2013  | Thu     | 7:20 AM    | NEEDHAM   | Non-fatal injury                    | 1                           | 0                        | Unknown             | V1: Travelling straight ahead / V2:Travelling straight ahead / V3:Travelling straight ahead                                            | V1:8 / V2:8 / V3:8        | V1:(Collision with motor vehicle in traffic) V2:(Collision with motor vehicle in traffic) V3:(Collision with motor vehicle in traffic)                                              | V1:(Passenger car) V2:(Passenger car) V3:(Light truck(van, mini-van, panel, pickup, sport utility) with only four tires)                                                                                                  |                   | Dry          | Daylight               | Clear             | HIGHLAND AVENUE / RAMP - HIGHLAND AVE SB TO RT 95 NB   | Local police  |
| 3414875                              | 2/6/2013   | Wed     | 8:50 AM    | NEEDHAM   | Non-fatal injury                    | 1                           | 0                        | Rear-end            | V1: Slowing or stopped in traffic / V2:Travelling straight ahead / V3:Travelling straight ahead                                        | V1:N / V2:N / V3:N        | V1:(Collision with motor vehicle in traffic) V2:(Collision with motor vehicle in traffic) V3:(Collision with motor vehicle in traffic)                                              | V1:(Passenger car) V2:(Light truck(van, mini-van, panel, pickup, sport utility) with only four tires) V3:(Light truck(van, mini-van, panel, pickup, sport                                                                 |                   | Wet          | Daylight               | Clear             | RT 128 / HIGHLAND AVE / YANKEE DIVISION HIGHWAY Rte 95 | Local police  |
| 2964664                              | 12/22/2011 | Thu     | 5:25 PM    | NEEDHAM   | Property damage only (none injured) | 0                           | 0                        | Rear-end            | V1: Slowing or stopped in traffic / V2:Slowing or stopped in traffic                                                                   | V1:E / V2:E               | V1:(Collision with motor vehicle in traffic) V2:(Collision with motor vehicle in traffic)                                                                                           | V1:(Passenger car) V2:(Light truck(van, mini-van, panel, pickup, sport utility) with only                                                                                                                                 |                   | Dry          | Dark - lighted roadway | Clear             | HIGHLAND AVENUE                                        | State police  |

| Crash Number                         | Crash Date | Weekday | Crash Time | City/Town | Crash Severity                      | Number of NonFatal Injuries | Number of Fatal Injuries | Manner of Collision | Vehicle Action Prior to Crash                                                                       | Vehicle Travel Directions | Most Harmful Events                                                                                                                    | Vehicle Configuration                                                                                                                                     | Non Motorist Type | Road Surface | Ambient Light          | Weather Condition | Roadway                                                             | Police Agency |
|--------------------------------------|------------|---------|------------|-----------|-------------------------------------|-----------------------------|--------------------------|---------------------|-----------------------------------------------------------------------------------------------------|---------------------------|----------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------|--------------|------------------------|-------------------|---------------------------------------------------------------------|---------------|
| 26: Highland Avenue at I-95 NB Ramps |            |         |            |           |                                     |                             |                          |                     |                                                                                                     |                           |                                                                                                                                        |                                                                                                                                                           |                   |              |                        |                   |                                                                     |               |
| 2988450                              | 1/17/2012  | Tue     | 11:19 AM   | NEEDHAM   | Non-fatal injury                    | 2                           | 0                        | Rear-end            | V1: Travelling straight ahead / V2:Slowing or stopped in traffic                                    | V1:N / V2:N               | V1:(Collision with motor vehicle in traffic) V2:(Collision with motor vehicle in traffic)                                              | V1:() V2:()                                                                                                                                               |                   | Wet          | Daylight               | Cloudy/Snow       | HIGHLAND AVENUE Rte 95                                              | Local police  |
| 3057996                              | 2/13/2012  | Mon     | 8:56 AM    | NEEDHAM   | Property damage only (none injured) | 0                           | 0                        | Rear-end            | V1: Slowing or stopped in traffic / V2:Slowing or stopped in traffic                                | V1:E / V2:E               | V1:(Collision with motor vehicle in traffic) V2:(Collision with motor vehicle in traffic)                                              | V1:(Passenger car) V2:(Light truck(van, mini-van, panel, pickup, sport utility) with only                                                                 |                   | Dry          | Daylight               | Clear             | HIGHLAND AVENUE / Rte 95                                            | Local police  |
| 3136568                              | 7/23/2011  | Sat     | 11:47 PM   | NEEDHAM   | Property damage only                | 0                           | 0                        | Single vehicle      | V1: Travelling straight ahead                                                                       | V1:W                      | V1:(Collision with embankment)                                                                                                         | V1:(Passenger car)                                                                                                                                        |                   | Dry          | Dark - lighted         | Clear             | HIGHLAND AVENUE / Rte 95                                            | Local police  |
| 3886235                              | 2/18/2014  | Tue     | 7:48 AM    | NEEDHAM   | Property damage only (none injured) | 0                           | 0                        | Rear-end            | V1: Travelling straight ahead / V2:Travelling straight ahead                                        | V1:E / V2:E               | V1:(Collision with motor vehicle in traffic),(Immersion) V2:(Collision with motor vehicle in traffic),(Immersion)                      | V1:(Passenger car) V2:(Passenger car)                                                                                                                     |                   | Wet          | Daylight               | Cloudy/Cloudy     | Rte 95 N / HIGHLAND AVENUE                                          | Local police  |
| 3566611                              | 8/21/2013  | Wed     | 6:49 AM    | NEEDHAM   | Property damage only (none injured) | 0                           | 0                        | Rear-end            | V1: Travelling straight ahead / V2:Travelling straight ahead                                        | V1:N / V2:N               | V1:(Collision with motor vehicle in traffic) V2:(Collision with motor vehicle in traffic)                                              | V1:(Light truck(van, mini-van, panel, pickup, sport utility) with only four tires) V2:(Light truck(van, mini-van, panel, pickup, sport utility) with only |                   | Dry          | Daylight               | Clear             | YANKEE DIVISION HIGHWAY Rte 95 N / RAMP-HIGHLAND AVE NB TO RT 95 NB | State police  |
| 3914868                              | 4/24/2014  | Thu     | 9:01 AM    | NEEDHAM   | Property damage only (none injured) | 0                           | 0                        | Rear-end            | V1: Slowing or stopped in traffic / V2:Travelling straight ahead                                    | V1:E / V2:E               | V1:(Collision with motor vehicle in traffic) V2:(Collision with motor vehicle in traffic)                                              | V1:(Passenger car) V2:(Single-unit truck (2-axle, 6-tire))                                                                                                |                   | Dry          | Daylight               | Clear/Clear       | Rte 95 N / HIGHLAND AVENUE                                          | Local police  |
| 3994756                              | 10/8/2014  | Wed     | 9:00 AM    | NEEDHAM   | Property damage only (none injured) | 0                           | 0                        | Rear-end            | V1: Slowing or stopped in traffic / V2:Slowing or stopped in traffic                                | V1:N / V2:N               | V1:(Collision with motor vehicle in traffic) V2:(Collision with motor vehicle in traffic)                                              | V1:(Passenger car) V2:(Passenger car)                                                                                                                     |                   | Dry          | Daylight               | Clear/Clear       | HIGHLAND AVE                                                        | Local police  |
| 4072844                              | 1/3/2015   | Sat     | 12:02 PM   | NEEDHAM   | Property damage only (none injured) | 0                           | 0                        | Rear-end            | V1: Slowing or stopped in traffic / V2:Travelling straight ahead                                    | V1:S / V2:S               | V1:(Collision with motor vehicle in traffic) V2:(Collision with motor vehicle in traffic)                                              | V1:(Passenger car) V2:(Passenger car)                                                                                                                     |                   | Dry          | Daylight               | Clear/Clear       | HIGHLAND AVENUE / RAMP-RTS 95 NB/128 NB TO HIGHLAND AVE SB          | Local police  |
| 4074526                              | 3/8/2015   | Sun     | 10:10 AM   | NEEDHAM   | Property damage only (none injured) | 0                           | 0                        | Rear-end            | V1: Entering traffic lane / V2:Entering traffic lane                                                | V1:N / V2:8               | V1:(Collision with motor vehicle in traffic) V2:(Collision with motor vehicle in traffic)                                              | V1:(Passenger car) V2:(Light truck(van, mini-van, panel, pickup, sport utility) with only                                                                 |                   | Dry          | Daylight               | Cloudy/Cloudy     | RAMP-RTS 95 NB/128 NB TO HIGHLAND AVE NB / HIGHLAND AVENUE          | Local police  |
| 4074562                              | 4/24/2015  | Fri     | 8:40 AM    | NEEDHAM   | Property damage only (none injured) | 0                           | 0                        | Rear-end            | V1: Slowing or stopped in traffic / V2:Travelling straight ahead                                    | V1:E / V2:E               | V1:(Collision with motor vehicle in traffic) V2:(Collision with motor vehicle in traffic)                                              | V1:(Passenger car) V2:(Passenger car)                                                                                                                     |                   | Dry          | Daylight               | Clear/Clear       | RAMP-RTS 95 NB/128 NB TO HIGHLAND AVE NB / HIGHLAND AVENUE          | Local police  |
| 4075394                              | 6/3/2015   | Wed     | 8:39 AM    | NEEDHAM   | Property damage only (none injured) | 0                           | 0                        | Rear-end            | V1: Entering traffic lane / V2:Entering traffic lane                                                | V1:N / V2:N               | V1:(Collision with motor vehicle in traffic) V2:(Collision with motor vehicle in traffic)                                              | V1:(Passenger car) V2:(Passenger car)                                                                                                                     |                   | Dry          | Daylight               | Clear/Clear       | RAMP-RTS 95 NB/128 NB TO HIGHLAND AVE NB / HIGHLAND AVENUE          | Local police  |
| 4075398                              | 4/30/2015  | Thu     | 9:10 AM    | NEEDHAM   | Property damage only (none injured) | 0                           | 0                        | Rear-end            | V1: Slowing or stopped in traffic / V2:Travelling straight ahead                                    | V1:E / V2:E               | V1:(Collision with motor vehicle in traffic) V2:(Collision with motor vehicle in traffic),(Collision with parked motor vehicle)        | V1:(Passenger car) V2:(Passenger car)                                                                                                                     |                   | Dry          | Daylight               | Clear/Clear       | RAMP-RTS 95 NB/128 NB TO HIGHLAND AVE NB / HIGHLAND AVENUE          | Local police  |
| 4084174                              | 7/25/2015  | Sat     | 3:51 PM    | NEEDHAM   | Non-fatal injury                    | 1                           | 0                        | Rear-end            | V1: Slowing or stopped in traffic / V2:Slowing or stopped in traffic                                | V1:E / V2:E               | V1:(Collision with motor vehicle in traffic) V2:(Collision with motor vehicle in traffic)                                              | V1:(Passenger car) V2:(Passenger car)                                                                                                                     |                   | Dry          | Daylight               | Clear             | HIGHLAND AVENUE / RAMP-RTS 95 NB/128 NB TO HIGHLAND AVE NB          | Local police  |
| 4173197                              | 11/30/2015 | Mon     | 7:07 PM    | NEEDHAM   | Non-fatal injury                    | 1                           | 0                        | Rear-end            | V1: Slowing or stopped in traffic / V2:Travelling straight ahead                                    | V1:E / V2:E               | V1:(Collision with motor vehicle in traffic) V2:(Collision with motor vehicle in traffic)                                              | V1:(Passenger car) V2:(Passenger car)                                                                                                                     |                   | Dry          | Dark - lighted roadway | Clear             | HIGHLAND AVENUE / RAMP-RTS 95 NB/128 NB TO HIGHLAND AVE NB          | Local police  |
| 4173530                              | 10/20/2015 | Tue     | 6:49 AM    | NEEDHAM   | Property damage only (none injured) | 0                           | 0                        | Rear-end            | V1: Slowing or stopped in traffic / V2:Slowing or stopped in traffic                                | V1:E / V2:E               | V1:(Collision with motor vehicle in traffic) V2:(Collision with motor vehicle in traffic)                                              | V1:(Passenger car) V2:()                                                                                                                                  |                   | Dry          | Daylight               | Clear             | / HIGHLAND AVENUE                                                   | Local police  |
| 4173541                              | 11/9/2015  | Mon     | 9:06 AM    | NEEDHAM   | Non-fatal injury                    | 1                           | 0                        | Rear-end            | V1: Slowing or stopped in traffic / V2:Slowing or stopped in traffic / V3:Travelling straight ahead | V1:N / V2:N / V3:N        | V1:(Collision with motor vehicle in traffic) V2:(Collision with motor vehicle in traffic) V3:(Collision with motor vehicle in traffic) | V1:(Passenger car) V2:(Passenger car) V3:(Passenger car)                                                                                                  |                   | Dry          | Daylight               | Clear             | / HIGHLAND AVENUE                                                   | Local police  |
| 4173561                              | 12/1/2015  | Tue     | 5:10 PM    | NEEDHAM   | Non-fatal injury                    | 1                           | 0                        | Rear-end            | V1: Slowing or stopped in traffic / V2:Travelling straight ahead                                    | V1:N / V2:N               | V1:(Collision with motor vehicle in traffic) V2:(Collision with motor vehicle in traffic)                                              | V1:(Passenger car) V2:(Light truck(van, mini-van, panel, pickup, sport utility) with only                                                                 |                   | Dry          | Dark - lighted roadway | Clear             | RAMP-RTS 95 NB/128 NB TO HIGHLAND AVE NB / HIGHLAND AVENUE          | Local police  |



| Crash Number                         | Crash Date | Weekday | Crash Time | City/Town | Crash Severity                      | Number of NonFatal Injuries | Number of Fatal Injuries | Manner of Collision       | Vehicle Action Prior to Crash                                        | Vehicle Travel Directions | Most Harmful Events                                                                       | Vehicle Configuration                                                                                                                                     | Non Motorist Type | Road Surface | Ambient Light              | Weather Condition | Roadway                                                    | Police Agency |
|--------------------------------------|------------|---------|------------|-----------|-------------------------------------|-----------------------------|--------------------------|---------------------------|----------------------------------------------------------------------|---------------------------|-------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------|--------------|----------------------------|-------------------|------------------------------------------------------------|---------------|
| 27: Highland Avenue at I-95 SB Ramps |            |         |            |           |                                     |                             |                          |                           |                                                                      |                           |                                                                                           |                                                                                                                                                           |                   |              |                            |                   |                                                            |               |
| 2870330                              | 10/14/2011 | Fri     | 3:05 PM    | NEEDHAM   | Property damage only (none injured) | 0                           | 0                        | Rear-end                  | V1: Entering traffic lane / V2:Entering traffic lane                 | V1:N / V2:N               | V1:(Collision with motor vehicle in traffic) V2:(Collision with motor vehicle in traffic) | V1:(Light truck(van, mini-van, panel, pickup, sport utility) with only four tires) V2:(Passenger car)                                                     |                   | Wet          | Daylight                   | Rain              | HIGHLAND AVENUE / Rte 95 S                                 | Local police  |
| 3244358                              | 4/7/2012   | Sat     | 1:52 PM    | NEEDHAM   | Property damage only (none injured) | 0                           | 0                        | Sideswipe, same direction | V1: Travelling straight ahead / V2:Turning left                      | V1:N / V2:N               | V1:(Collision with motor vehicle in traffic) V2:(Collision with motor vehicle in traffic) | V1:(Passenger car) V2:(Light truck(van, mini-van, panel, pickup, sport utility) with only                                                                 |                   | Dry          | Daylight                   | Cloudy            | HIGHLAND AVENUE                                            | Local police  |
| 3365136                              | 12/3/2012  | Mon     | 9:51 AM    | NEEDHAM   | Non-fatal injury                    | 2                           | 0                        | Rear-end                  | V1: Slowing or stopped in traffic / V2:Entering traffic lane         | V1:S / V2:S               | V1:(Collision with motor vehicle in traffic) V2:(Collision with motor vehicle in traffic) | V1:(Passenger car) V2:(Passenger car)                                                                                                                     |                   | Dry          | Daylight                   | Clear/Clear       | HIGHLAND AVENUE Rte 95                                     | Local police  |
| 3475779                              | 1/3/2013   | Thu     | 2:29 PM    | NEEDHAM   | Property damage only (none injured) | 0                           | 0                        | Rear-end                  | V1: Slowing or stopped in traffic / V2:Travelling straight ahead     | V1:E / V2:E               | V1:(Collision with motor vehicle in traffic) V2:(Collision with motor vehicle in traffic) | V1:(Light truck(van, mini-van, panel, pickup, sport utility) with only four tires) V2:(Passenger car)                                                     |                   | Dry          | Daylight                   | Clear/Clear       | Rte 95 S / HIGHLAND AVENUE                                 | Local police  |
| 3545753                              | 7/6/2013   | Sat     | 10:56 AM   | NEEDHAM   | Property damage only (none injured) | 0                           | 0                        | Rear-end                  | V1: Entering traffic lane / V2:Slowing or stopped in traffic         | V1:S / V2:S               | V1:(Collision with motor vehicle in traffic) V2:(Collision with motor vehicle in traffic) | V1:(Passenger car) V2:(Passenger car)                                                                                                                     |                   | Dry          | Daylight                   | Clear/Clear       | ON RAMP Rte 128 S                                          | Local police  |
| 3774400                              | 12/4/2013  | Wed     | 8:30 PM    | NEEDHAM   | Non-fatal injury                    | 2                           | 0                        | Rear-end                  | V1: Travelling straight ahead / V2:Travelling straight ahead         | V1:E / V2:E               | V1:(Collision with motor vehicle in traffic) V2:(Collision with motor vehicle in traffic) | V1:(Light truck(van, mini-van, panel, pickup, sport utility) with only four tires) V2:(Light truck(van, mini-van, panel, pickup, sport utility) with only |                   | Dry          | Dark - lighted roadway     | Clear/Clear       | HIGHLAND AVENUE / RAMP-RT 95 SB TO HIGHLAND AVE NB         | Local police  |
| 3923455                              | 8/20/2014  | Wed     | 12:55 AM   | NEEDHAM   | Non-fatal injury                    | 1                           | 0                        | Rear-end                  | V1: Slowing or stopped in traffic / V2:Entering traffic lane         | V1:S / V2:S               | V1:(Collision with motor vehicle in traffic) V2:(Collision with motor vehicle in traffic) | V1:(Passenger car) V2:(Light truck(van, mini-van, panel, pickup, sport utility) with only                                                                 |                   | Dry          | Dark - roadway not lighted | Clear             | RAMP-HIGHLAND AVE SB TO RTS 95 SB/128 SB                   | State police  |
| 3925455                              | 5/5/2014   | Mon     | 9:52 AM    | NEEDHAM   | Non-fatal injury                    | 1                           | 0                        | Rear-end                  | V1: Slowing or stopped in traffic / V2:Slowing or stopped in traffic | V1:E / V2:E               | V1:(Collision with motor vehicle in traffic) V2:(Collision with motor vehicle in traffic) | V1:(Passenger car) V2:(Passenger car)                                                                                                                     |                   | Dry          | Daylight                   | Clear/Clear       | RAMP-RTS 95 SB/128 SB TO HIGHLAND AVE NB / HIGHLAND AVENUE | Local police  |



## INTERSECTION CRASH RATE WORKSHEET

CITY/TOWN : Newton, MA COUNT DATE : October 2017

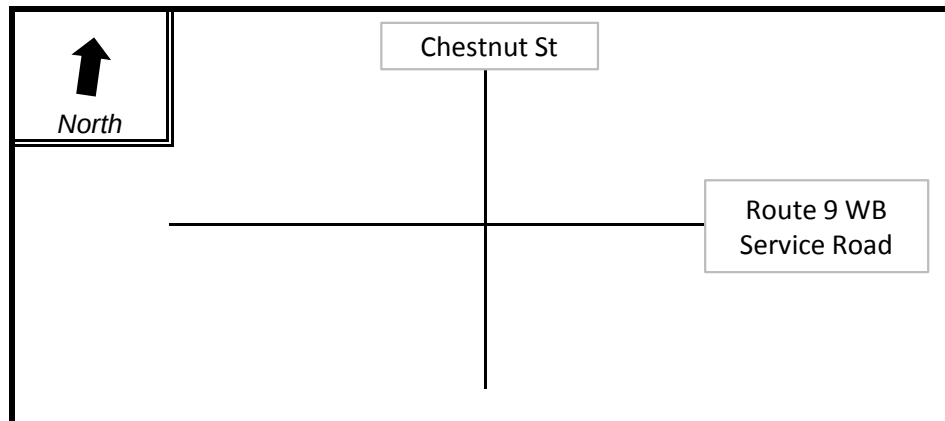
DISTRICT : 6 UNSIGNALIZED : ☒ 0.53 SIGNALIZED : ☐ 0.70

### ~ INTERSECTION DATA ~

MAJOR STREET : Chestnut Street

MINOR STREET(S) : Route 9 WB Service Road

**INTERSECTION  
DIAGRAM**  
(Label Approaches)



### PEAK HOUR VOLUMES

|                               |     |     |     |     |   |                                   |
|-------------------------------|-----|-----|-----|-----|---|-----------------------------------|
| APPROACH :                    | 1   | 2   | 3   | 4   | 5 | Total Peak Hourly Approach Volume |
| DIRECTION :                   | EB  | WB  | NB  | SB  |   |                                   |
| PEAK HOURLY VOLUMES (AM/PM) : | 145 | 175 | 635 | 615 |   | 1,570                             |

" K " FACTOR :

**0.090**

INTERSECTION ADT ( V ) = TOTAL DAILY APPROACH VOLUME :

**17,444**

TOTAL # OF CRASHES :

**5**

# OF YEARS :

**5**

AVERAGE # OF CRASHES PER YEAR ( A ) :

**1.00**

CRASH RATE CALCULATION :

**0.16**

RATE =  $\frac{(A * 1,000,000)}{(V * 365)}$

Comments : \_\_\_\_\_

Project Title & Date: \_\_\_\_\_

## INTERSECTION CRASH RATE WORKSHEET

CITY/TOWN : Newton, MA COUNT DATE : October 2017

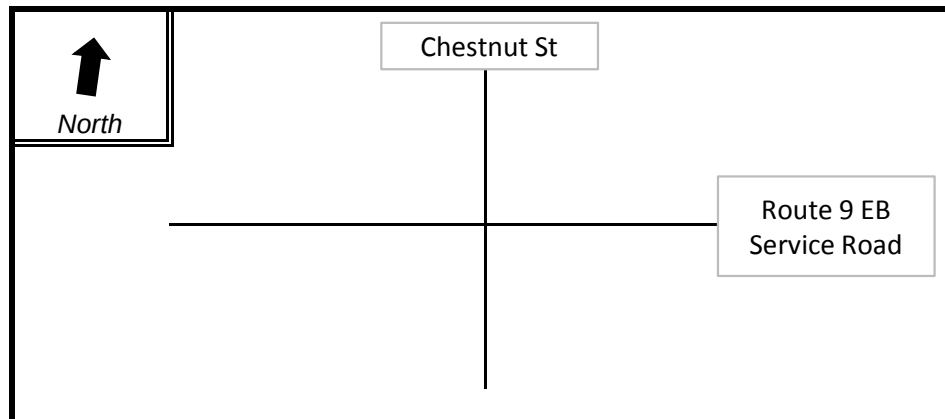
DISTRICT : 6 UNSIGNALIZED : ☒ 0.53 SIGNALIZED : ☐ 0.70

### ~ INTERSECTION DATA ~

MAJOR STREET : Chestnut Street

MINOR STREET(S) : Route 9 EB Service Road

**INTERSECTION  
DIAGRAM**  
(Label Approaches)



### PEAK HOUR VOLUMES

|                               |     |    |     |     |   |                                   |
|-------------------------------|-----|----|-----|-----|---|-----------------------------------|
| APPROACH :                    | 1   | 2  | 3   | 4   | 5 | Total Peak Hourly Approach Volume |
| DIRECTION :                   | EB  | WB | NB  | SB  |   |                                   |
| PEAK HOURLY VOLUMES (AM/PM) : | 325 | 20 | 415 | 540 |   | 1,300                             |

" K " FACTOR :

**0.090**

INTERSECTION ADT ( V ) = TOTAL DAILY APPROACH VOLUME :

**14,444**

TOTAL # OF CRASHES :

**3**

# OF YEARS :

**5**

AVERAGE # OF CRASHES PER YEAR ( A ) :

**0.60**

**CRASH RATE CALCULATION :**

**0.11**

RATE =  $\frac{(A * 1,000,000)}{(V * 365)}$

Comments : \_\_\_\_\_

Project Title & Date: \_\_\_\_\_

## INTERSECTION CRASH RATE WORKSHEET

CITY/TOWN : Newton, MA COUNT DATE : October 2017

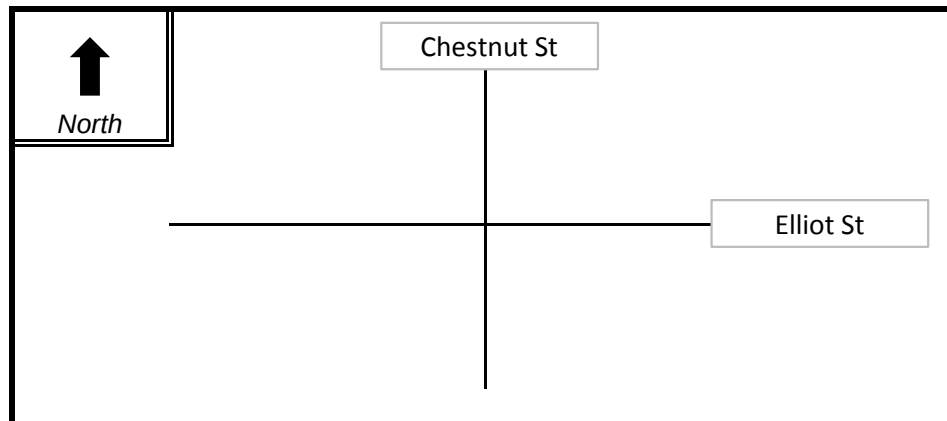
DISTRICT : 6 UNSIGNALIZED :  SIGNALIZED :  0.70

### ~ INTERSECTION DATA ~

MAJOR STREET : Chestnut Street

MINOR STREET(S) : Elliot Street

**INTERSECTION  
DIAGRAM**  
(Label Approaches)



### PEAK HOUR VOLUMES

|                               |     |     |     |     |   |                                   |
|-------------------------------|-----|-----|-----|-----|---|-----------------------------------|
| APPROACH :                    | 1   | 2   | 3   | 4   | 5 | Total Peak Hourly Approach Volume |
| DIRECTION :                   | EB  | WB  | NB  | SB  |   |                                   |
| PEAK HOURLY VOLUMES (AM/PM) : | 450 | 245 | 290 | 640 |   | 1,625                             |

" K " FACTOR :

**0.090**

INTERSECTION ADT ( V ) = TOTAL DAILY APPROACH VOLUME :

**18,056**

TOTAL # OF CRASHES :

23

# OF YEARS :

5

AVERAGE # OF CRASHES PER YEAR ( A ) :

**4.60**

**CRASH RATE CALCULATION :**

**0.70**

RATE =  $\frac{(A * 1,000,000)}{(V * 365)}$

Comments : \_\_\_\_\_

Project Title & Date: \_\_\_\_\_

## INTERSECTION CRASH RATE WORKSHEET

CITY/TOWN : Newton, MA COUNT DATE : October 2017

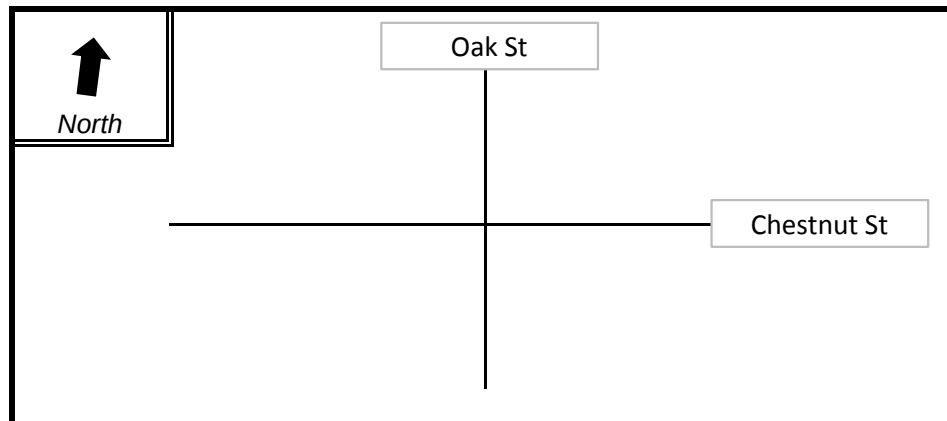
DISTRICT : 6 UNSIGNALIZED :  SIGNALIZED :  0.70

### ~ INTERSECTION DATA ~

MAJOR STREET : Oak Street

MINOR STREET(S) : Chestnut Street

**INTERSECTION  
DIAGRAM**  
(Label Approaches)



### PEAK HOUR VOLUMES

|                               |     |    |     |     |   |                                   |
|-------------------------------|-----|----|-----|-----|---|-----------------------------------|
| APPROACH :                    | 1   | 2  | 3   | 4   | 5 | Total Peak Hourly Approach Volume |
| DIRECTION :                   | EB  | WB | NB  | SB  |   |                                   |
| PEAK HOURLY VOLUMES (AM/PM) : | 265 | 65 | 375 | 155 |   | 860                               |

" K " FACTOR :

**0.090**

INTERSECTION ADT ( V ) = TOTAL DAILY APPROACH VOLUME :

**9,556**

TOTAL # OF CRASHES :

**15**

# OF YEARS :

**5**

AVERAGE # OF CRASHES PER YEAR ( A ) :

**3.00**

**CRASH RATE CALCULATION :**

**0.86**

RATE =  $\frac{(A * 1,000,000)}{(V * 365)}$

Comments : \_\_\_\_\_

Project Title & Date: \_\_\_\_\_

## INTERSECTION CRASH RATE WORKSHEET

CITY/TOWN : Newton, MA COUNT DATE : October 2017

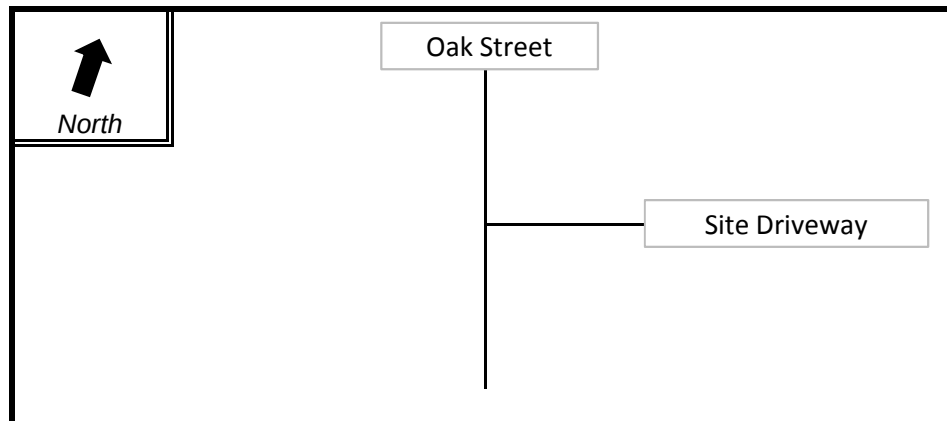
DISTRICT : 6 UNSIGNALIZED : ☒ 0.53 SIGNALIZED : ☐ 0.70

### ~ INTERSECTION DATA ~

MAJOR STREET : Oak Street

MINOR STREET(S) : Site Driveway

**INTERSECTION  
DIAGRAM**  
(Label Approaches)



### PEAK HOUR VOLUMES

| APPROACH :                    | 1  | 2  | 3   | 4   | 5 | Total Peak Hourly Approach Volume |
|-------------------------------|----|----|-----|-----|---|-----------------------------------|
| DIRECTION :                   | EB | WB | NB  | SB  |   |                                   |
| PEAK HOURLY VOLUMES (AM/PM) : |    | 2  | 375 | 395 |   | 772                               |

" K " FACTOR :

**0.090**

INTERSECTION ADT ( V ) = TOTAL DAILY  
APPROACH VOLUME :

**8,578**

TOTAL # OF CRASHES :

**1**

# OF  
YEARS :

**5**

AVERAGE # OF  
CRASHES PER YEAR ( A ) :

**0.20**

**CRASH RATE CALCULATION :**

**0.06**

RATE =  $\frac{(A * 1,000,000)}{(V * 365)}$

Comments : \_\_\_\_\_

Project Title & Date: \_\_\_\_\_

## INTERSECTION CRASH RATE WORKSHEET

CITY/TOWN : Newton, MA COUNT DATE : May 2017

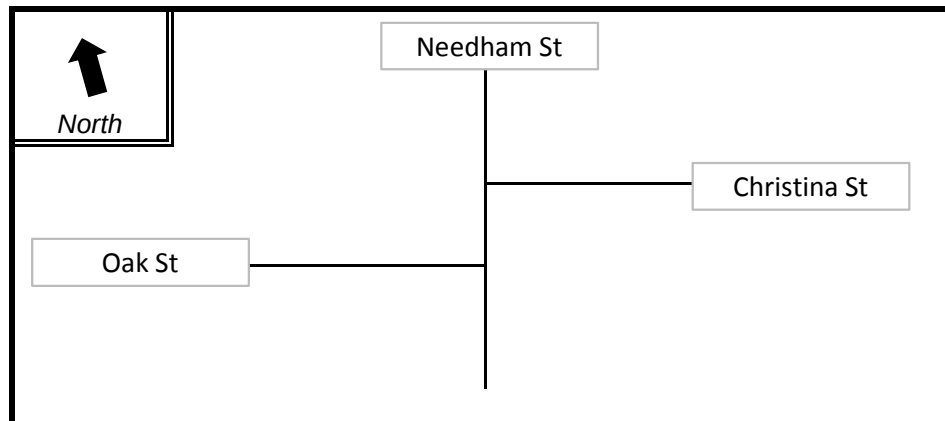
DISTRICT : 6 UNSIGNALIZED :  SIGNALIZED :  0.70

### ~ INTERSECTION DATA ~

MAJOR STREET : Needham Street

MINOR STREET(S) : Oak Street, Christina Street

**INTERSECTION  
DIAGRAM**  
(Label Approaches)



### PEAK HOUR VOLUMES

|                               |     |     |     |     |   |                                   |
|-------------------------------|-----|-----|-----|-----|---|-----------------------------------|
| APPROACH :                    | 1   | 2   | 3   | 4   | 5 | Total Peak Hourly Approach Volume |
| DIRECTION :                   | EB  | WB  | NB  | SB  |   |                                   |
| PEAK HOURLY VOLUMES (AM/PM) : | 405 | 280 | 815 | 735 |   | 2,235                             |

" K " FACTOR :

**0.090**

INTERSECTION ADT ( V ) = TOTAL DAILY APPROACH VOLUME :

**24,833**

TOTAL # OF CRASHES :

**36**

# OF YEARS :

**5**

AVERAGE # OF CRASHES PER YEAR ( A ) :

**7.20**

CRASH RATE CALCULATION :

**0.79**

RATE =  $\frac{(A * 1,000,000)}{(V * 365)}$

Comments : \_\_\_\_\_

Project Title & Date: \_\_\_\_\_



## INTERSECTION CRASH RATE WORKSHEET

CITY/TOWN : Newton, MA COUNT DATE : October 2017

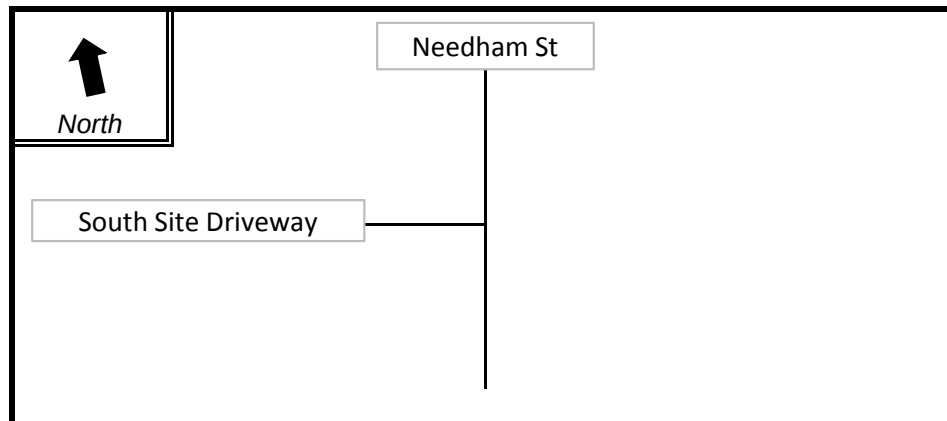
DISTRICT : 6 UNSIGNALIZED : ☒ 0.53 SIGNALIZED : ☐ 0.70

### ~ INTERSECTION DATA ~

MAJOR STREET : Needham Street

MINOR STREET(S) : South Site Driveway

**INTERSECTION  
DIAGRAM**  
(Label Approaches)



### PEAK HOUR VOLUMES

|                               |    |    |     |     |   |                                   |
|-------------------------------|----|----|-----|-----|---|-----------------------------------|
| APPROACH :                    | 1  | 2  | 3   | 4   | 5 | Total Peak Hourly Approach Volume |
| DIRECTION :                   | EB | WB | NB  | SB  |   |                                   |
| PEAK HOURLY VOLUMES (AM/PM) : |    |    | 800 | 735 |   | 1,535                             |

" K " FACTOR :

**0.090**

INTERSECTION ADT ( V ) = TOTAL DAILY APPROACH VOLUME :

**17,056**

TOTAL # OF CRASHES :

**6**

# OF YEARS :

**5**

AVERAGE # OF CRASHES PER YEAR ( A ) :

**1.20**

**CRASH RATE CALCULATION :**

**0.19**

RATE =  $\frac{(A * 1,000,000)}{(V * 365)}$

Comments : \_\_\_\_\_

Project Title & Date: \_\_\_\_\_

## INTERSECTION CRASH RATE WORKSHEET

CITY/TOWN : Newton, MA COUNT DATE : October 2017

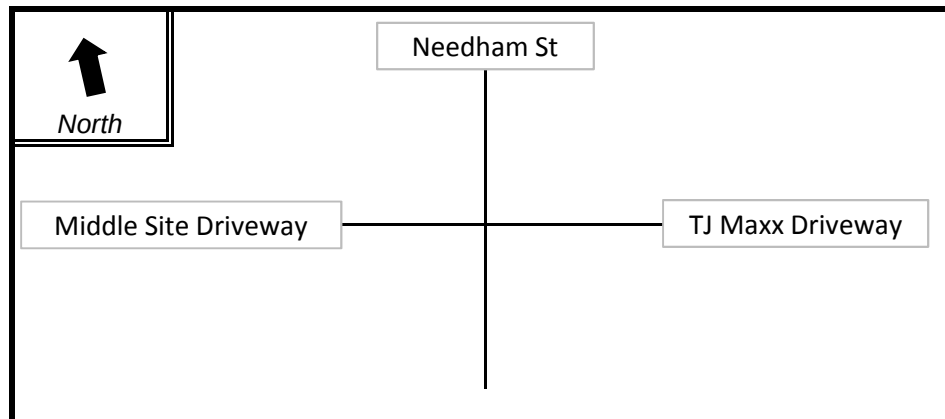
DISTRICT : 6 UNSIGNALIZED : ☒ 0.53 SIGNALIZED : ☐ 0.70

### ~ INTERSECTION DATA ~

MAJOR STREET : Needham Street

MINOR STREET(S) : Middle Site Driveway, TJ Maxx Driveway

INTERSECTION  
DIAGRAM  
(Label Approaches)



### PEAK HOUR VOLUMES

|                               |    |    |     |     |   |                                   |
|-------------------------------|----|----|-----|-----|---|-----------------------------------|
| APPROACH :                    | 1  | 2  | 3   | 4   | 5 | Total Peak Hourly Approach Volume |
| DIRECTION :                   | EB | WB | NB  | SB  |   |                                   |
| PEAK HOURLY VOLUMES (AM/PM) : | 90 | 5  | 735 | 630 |   | 1,460                             |

" K " FACTOR :

**0.090**

INTERSECTION ADT ( V ) = TOTAL DAILY APPROACH VOLUME :

**16,222**

TOTAL # OF CRASHES :

15

# OF YEARS :

5

AVERAGE # OF CRASHES PER YEAR ( A ) :

**3.00**

CRASH RATE CALCULATION :

**0.51**

RATE =  $\frac{(A * 1,000,000)}{(V * 365)}$

Comments : \_\_\_\_\_

Project Title & Date: \_\_\_\_\_

## INTERSECTION CRASH RATE WORKSHEET

CITY/TOWN : Newton, MA COUNT DATE : October 2017

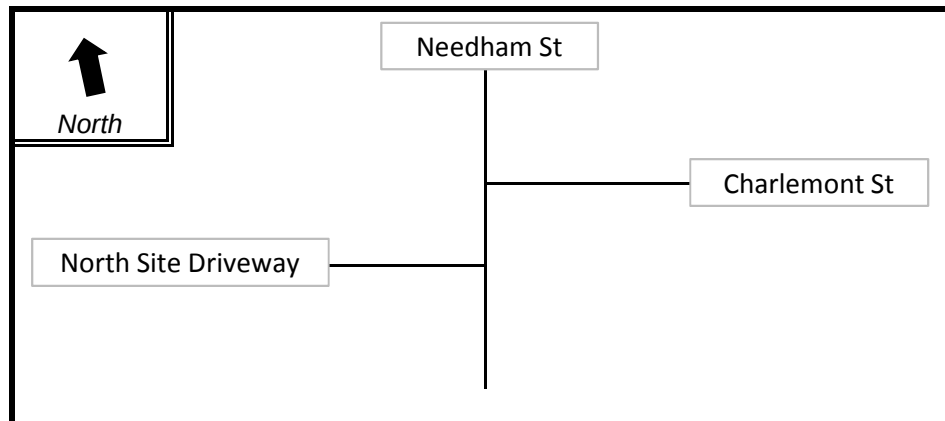
DISTRICT : 6 UNSIGNALIZED : ☒ 0.53 SIGNALIZED : ☐ 0.70

### ~ INTERSECTION DATA ~

MAJOR STREET : Needham Street

MINOR STREET(S) : Charlemont Street, North Site Driveway

**INTERSECTION  
DIAGRAM**  
(Label Approaches)



### PEAK HOUR VOLUMES

|                               |     |    |     |     |   |                                   |
|-------------------------------|-----|----|-----|-----|---|-----------------------------------|
| APPROACH :                    | 1   | 2  | 3   | 4   | 5 | Total Peak Hourly Approach Volume |
| DIRECTION :                   | EB  | WB | NB  | SB  |   |                                   |
| PEAK HOURLY VOLUMES (AM/PM) : | 110 | 45 | 685 | 655 |   | 1,495                             |

" K " FACTOR :

**0.090**

INTERSECTION ADT ( V ) = TOTAL DAILY APPROACH VOLUME :

**16,611**

TOTAL # OF CRASHES :

**35**

# OF YEARS :

**5**

AVERAGE # OF CRASHES PER YEAR ( A ) :

**7.00**

CRASH RATE CALCULATION :

**1.15**

RATE =  $\frac{(A * 1,000,000)}{(V * 365)}$

Comments : \_\_\_\_\_

Project Title & Date: \_\_\_\_\_

## INTERSECTION CRASH RATE WORKSHEET

CITY/TOWN : Newton, MA COUNT DATE : May 2017

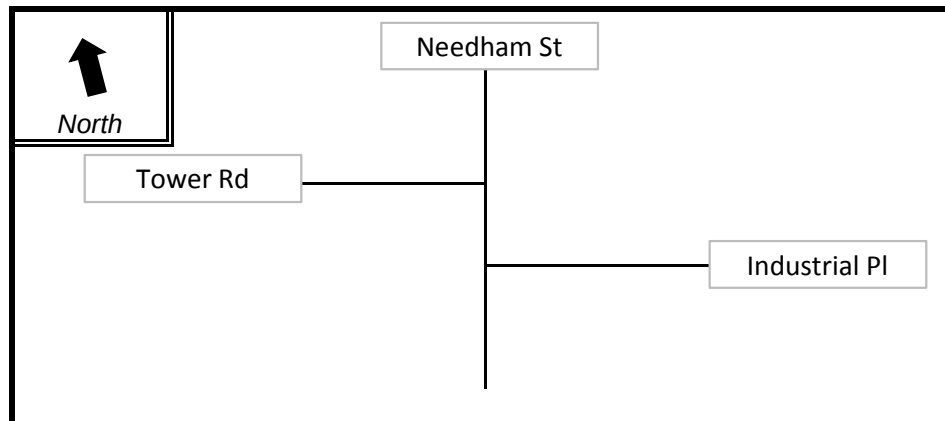
DISTRICT : 6 UNSIGNALIZED : ☒ 0.53 SIGNALIZED : ☐ 0.70

### ~ INTERSECTION DATA ~

MAJOR STREET : Needham Street

MINOR STREET(S) : Tower Road, Industrial Place

**INTERSECTION  
DIAGRAM**  
(Label Approaches)



### PEAK HOUR VOLUMES

| APPROACH :                    | 1   | 2   | 3   | 4   | 5 | Total Peak Hourly Approach Volume |
|-------------------------------|-----|-----|-----|-----|---|-----------------------------------|
| DIRECTION :                   | EB  | WB  | NB  | SB  |   |                                   |
| PEAK HOURLY VOLUMES (AM/PM) : | 145 | 115 | 770 | 595 |   | 1,625                             |

" K " FACTOR :

**0.090**

INTERSECTION ADT ( V ) = TOTAL DAILY  
APPROACH VOLUME :

**18,056**

TOTAL # OF CRASHES :

23

# OF  
YEARS :

5

AVERAGE # OF  
CRASHES PER YEAR ( A ) :

**4.60**

**CRASH RATE CALCULATION :**

**0.70**

RATE =  $\frac{(A * 1,000,000)}{(V * 365)}$

Comments : \_\_\_\_\_

Project Title & Date: \_\_\_\_\_

## INTERSECTION CRASH RATE WORKSHEET

CITY/TOWN : Newton, MA COUNT DATE : October 2017

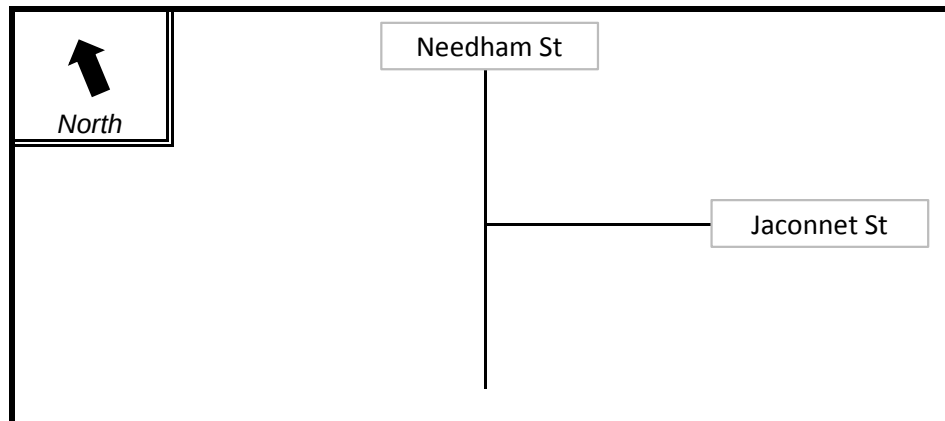
DISTRICT : 6 UNSIGNALIZED : ☒ 0.53 SIGNALIZED : ☐ 0.70

### ~ INTERSECTION DATA ~

MAJOR STREET : Needham Street

MINOR STREET(S) : Jaconnet Street

**INTERSECTION  
DIAGRAM**  
(Label Approaches)



### PEAK HOUR VOLUMES

| APPROACH :                    | 1  | 2  | 3   | 4   | 5 | Total Peak Hourly Approach Volume |
|-------------------------------|----|----|-----|-----|---|-----------------------------------|
| DIRECTION :                   | EB | WB | NB  | SB  |   |                                   |
| PEAK HOURLY VOLUMES (AM/PM) : |    | 85 | 710 | 585 |   | 1,380                             |

" K " FACTOR :

**0.090**

INTERSECTION ADT ( V ) = TOTAL DAILY APPROACH VOLUME :

**15,333**

TOTAL # OF CRASHES :

**9**

# OF YEARS :

**5**

AVERAGE # OF CRASHES PER YEAR ( A ) :

**1.80**

**CRASH RATE CALCULATION :**

**0.32**

RATE =  $\frac{(A * 1,000,000)}{(V * 365)}$

Comments : \_\_\_\_\_

Project Title & Date: \_\_\_\_\_

## INTERSECTION CRASH RATE WORKSHEET

CITY/TOWN : Newton, MA COUNT DATE : October 2017

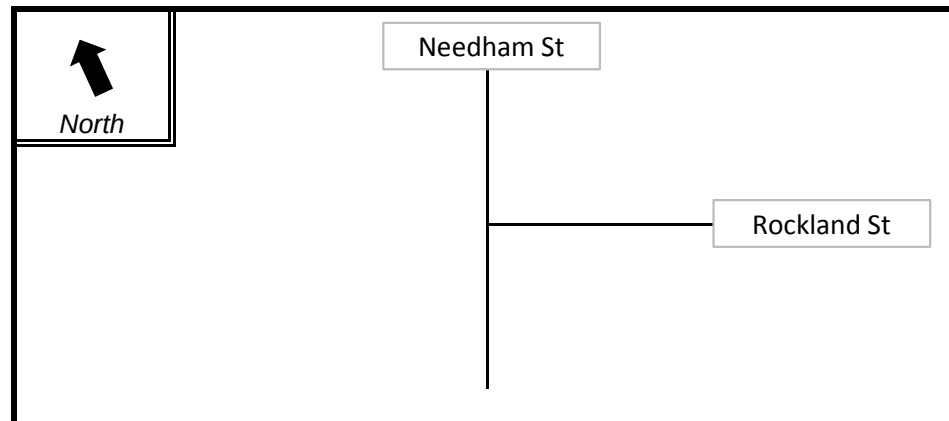
DISTRICT : 6 UNSIGNALIZED : ☒ 0.53 SIGNALIZED : ☐ 0.70

### ~ INTERSECTION DATA ~

MAJOR STREET : Needham Street

MINOR STREET(S) : Rockland Street

**INTERSECTION  
DIAGRAM**  
(Label Approaches)



### PEAK HOUR VOLUMES

|                               |    |    |     |     |   |                                   |
|-------------------------------|----|----|-----|-----|---|-----------------------------------|
| APPROACH :                    | 1  | 2  | 3   | 4   | 5 | Total Peak Hourly Approach Volume |
| DIRECTION :                   | EB | WB | NB  | SB  |   |                                   |
| PEAK HOURLY VOLUMES (AM/PM) : |    | 15 | 715 | 640 |   | 1,370                             |

" K " FACTOR :

**0.090**

INTERSECTION ADT ( V ) = TOTAL DAILY APPROACH VOLUME :

**15,222**

TOTAL # OF CRASHES :

**18**

# OF YEARS :

**5**

AVERAGE # OF CRASHES PER YEAR ( A ) :

**3.60**

**CRASH RATE CALCULATION :**

**0.65**

RATE =  $\frac{(A * 1,000,000)}{(V * 365)}$

Comments : \_\_\_\_\_

Project Title & Date: \_\_\_\_\_

## INTERSECTION CRASH RATE WORKSHEET

CITY/TOWN : Newton, MA COUNT DATE : May 2017

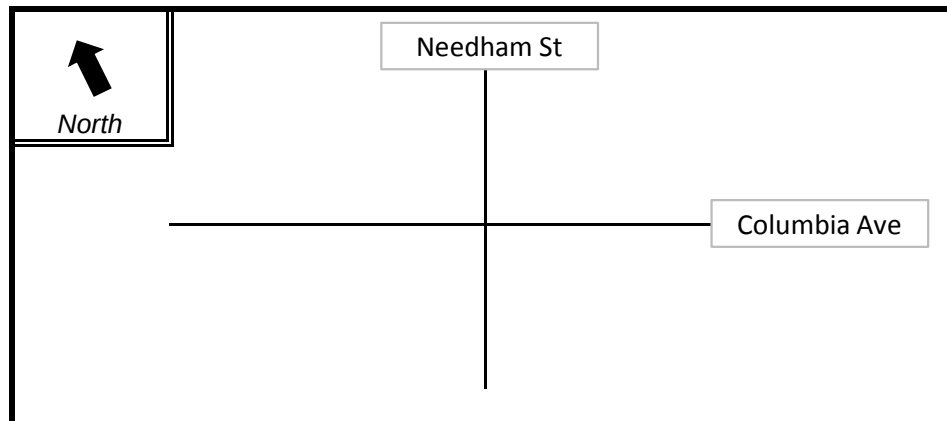
DISTRICT : 6 UNSIGNALIZED :  SIGNALIZED :  0.70

### ~ INTERSECTION DATA ~

MAJOR STREET : Needham Street

MINOR STREET(S) : Columbia Avenue

**INTERSECTION  
DIAGRAM**  
(Label Approaches)



### PEAK HOUR VOLUMES

|                               |    |    |     |     |   |                                   |
|-------------------------------|----|----|-----|-----|---|-----------------------------------|
| APPROACH :                    | 1  | 2  | 3   | 4   | 5 | Total Peak Hourly Approach Volume |
| DIRECTION :                   | EB | WB | NB  | SB  |   |                                   |
| PEAK HOURLY VOLUMES (AM/PM) : | 25 | 10 | 765 | 585 |   | 1,385                             |

" K " FACTOR :

**0.090**

INTERSECTION ADT ( V ) = TOTAL DAILY APPROACH VOLUME :

**15,389**

TOTAL # OF CRASHES :

**33**

# OF YEARS :

**5**

AVERAGE # OF CRASHES PER YEAR ( A ) :

**6.60**

**CRASH RATE CALCULATION :**

**1.18**

RATE =  $\frac{(A * 1,000,000)}{(V * 365)}$

Comments : \_\_\_\_\_

Project Title & Date: \_\_\_\_\_

## INTERSECTION CRASH RATE WORKSHEET

CITY/TOWN : Newton, MA COUNT DATE : May 2017

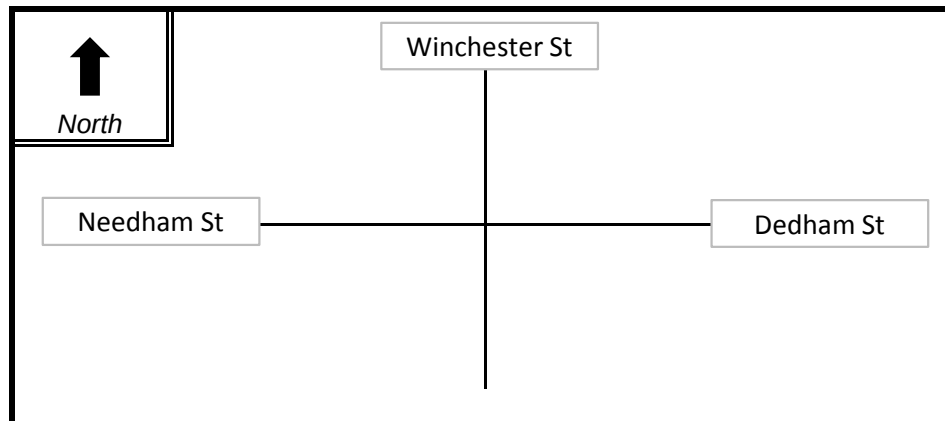
DISTRICT : 6 UNSIGNALIZED :  SIGNALIZED :  0.70

### ~ INTERSECTION DATA ~

MAJOR STREET : Winchester Street

MINOR STREET(S) : Needham Street, Dedham Street

**INTERSECTION  
DIAGRAM**  
(Label Approaches)



### PEAK HOUR VOLUMES

|                               |     |     |     |     |   |                                   |
|-------------------------------|-----|-----|-----|-----|---|-----------------------------------|
| APPROACH :                    | 1   | 2   | 3   | 4   | 5 | Total Peak Hourly Approach Volume |
| DIRECTION :                   | EB  | WB  | NB  | SB  |   |                                   |
| PEAK HOURLY VOLUMES (AM/PM) : | 705 | 175 | 315 | 790 |   | 1,985                             |

" K " FACTOR :

**0.090**

INTERSECTION ADT ( V ) = TOTAL DAILY APPROACH VOLUME :

**22,056**

TOTAL # OF CRASHES :

**39**

# OF YEARS :

**5**

AVERAGE # OF CRASHES PER YEAR ( A ) :

**7.80**

**CRASH RATE CALCULATION :**

**0.97**

RATE =  $\frac{(A * 1,000,000)}{(V * 365)}$

Comments : \_\_\_\_\_

Project Title & Date: \_\_\_\_\_



## INTERSECTION CRASH RATE WORKSHEET

CITY/TOWN : Newton, MA COUNT DATE : May 2017

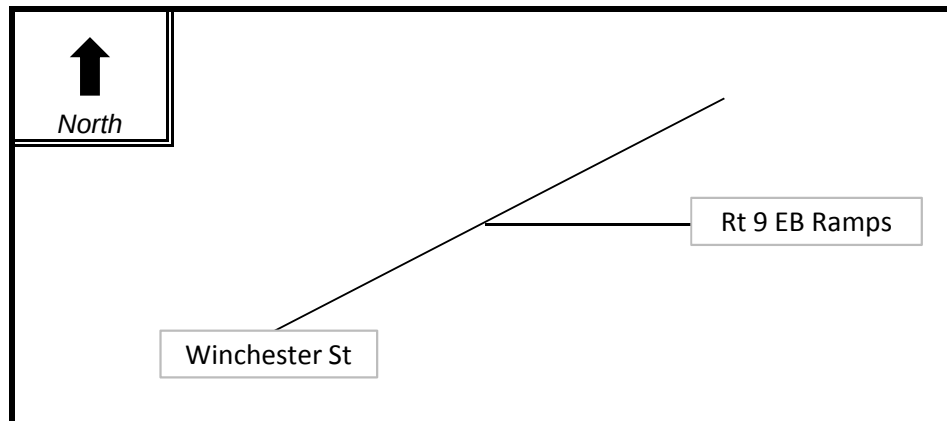
DISTRICT : 6 UNSIGNALIZED : ☒ 0.53 SIGNALIZED : ☐ 0.70

### ~ INTERSECTION DATA ~

MAJOR STREET : Winchester Street

MINOR STREET(S) : Route 9 EB Ramps

**INTERSECTION  
DIAGRAM**  
(Label Approaches)



### PEAK HOUR VOLUMES

|                               |    |     |       |     |   |                                   |
|-------------------------------|----|-----|-------|-----|---|-----------------------------------|
| APPROACH :                    | 1  | 2   | 3     | 4   | 5 | Total Peak Hourly Approach Volume |
| DIRECTION :                   | EB | WB  | NB    | SB  |   |                                   |
| PEAK HOURLY VOLUMES (AM/PM) : |    | 280 | 1,025 | 975 |   | 2,280                             |

" K " FACTOR :

**0.090**

INTERSECTION ADT ( V ) = TOTAL DAILY APPROACH VOLUME :

**25,333**

TOTAL # OF CRASHES :

19

# OF YEARS :

5

AVERAGE # OF CRASHES PER YEAR ( A ) :

**3.80**

**CRASH RATE CALCULATION :**

**0.41**

RATE =  $\frac{(A * 1,000,000)}{(V * 365)}$

Comments : \_\_\_\_\_

Project Title & Date: \_\_\_\_\_

## INTERSECTION CRASH RATE WORKSHEET

CITY/TOWN : Newton, MA COUNT DATE : May 2017

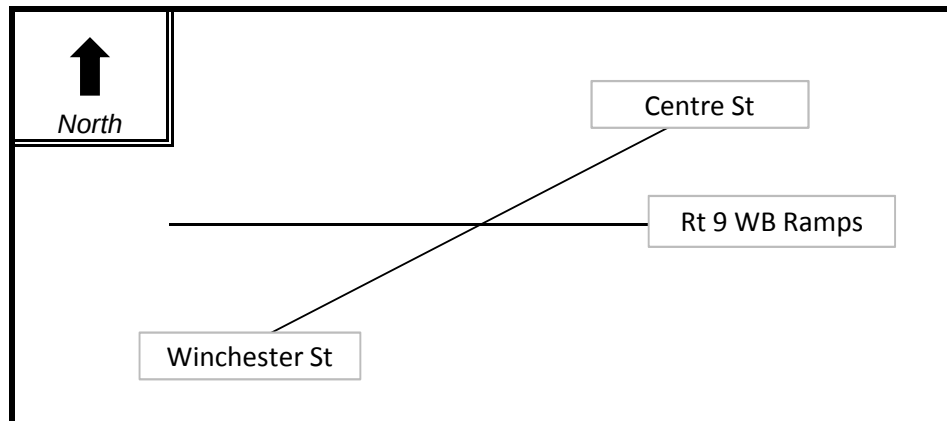
DISTRICT : 6 UNSIGNALIZED : ☒ 0.53 SIGNALIZED : ☐ 0.70

### ~ INTERSECTION DATA ~

MAJOR STREET : Winchester Street / Centre Street

MINOR STREET(S) : Route 9 WB Ramps

**INTERSECTION  
DIAGRAM**  
(Label Approaches)



### PEAK HOUR VOLUMES

|                               |    |     |     |     |   |                                   |
|-------------------------------|----|-----|-----|-----|---|-----------------------------------|
| APPROACH :                    | 1  | 2   | 3   | 4   | 5 | Total Peak Hourly Approach Volume |
| DIRECTION :                   | EB | WB  | NB  | SB  |   |                                   |
| PEAK HOURLY VOLUMES (AM/PM) : | 40 | 140 | 925 | 940 |   | 2,045                             |

" K " FACTOR :

**0.090**

INTERSECTION ADT ( V ) = TOTAL DAILY APPROACH VOLUME :

**22,722**

TOTAL # OF CRASHES :

**8**

# OF YEARS :

**5**

AVERAGE # OF CRASHES PER YEAR ( A ) :

**1.60**

**CRASH RATE CALCULATION :**

**0.19**

RATE =  $\frac{(A * 1,000,000)}{(V * 365)}$

Comments : \_\_\_\_\_

Project Title & Date: \_\_\_\_\_

## INTERSECTION CRASH RATE WORKSHEET

CITY/TOWN : Newton, MA COUNT DATE : October 2017

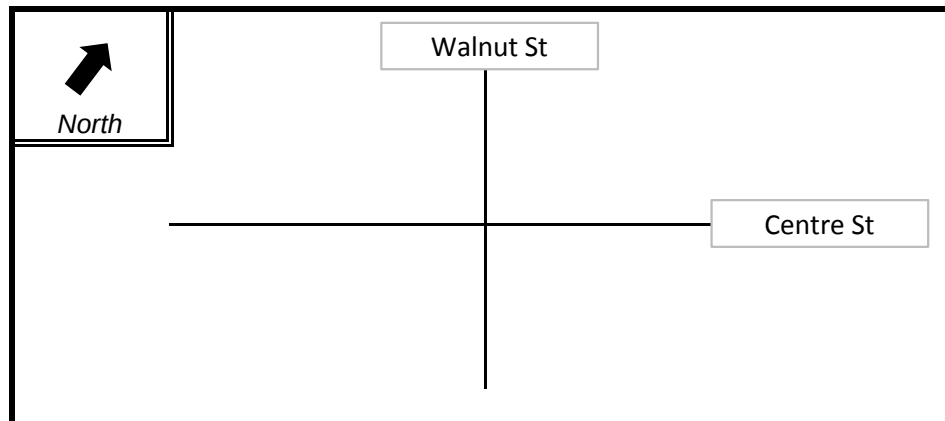
DISTRICT : 6 UNSIGNALIZED :  SIGNALIZED :  0.70

### ~ INTERSECTION DATA ~

MAJOR STREET : Centre Street

MINOR STREET(S) : Walnut Street

**INTERSECTION  
DIAGRAM**  
(Label Approaches)



### PEAK HOUR VOLUMES

|                               |     |     |     |     |   |                                   |
|-------------------------------|-----|-----|-----|-----|---|-----------------------------------|
| APPROACH :                    | 1   | 2   | 3   | 4   | 5 | Total Peak Hourly Approach Volume |
| DIRECTION :                   | NEB | SWB | NWB | SEB |   |                                   |
| PEAK HOURLY VOLUMES (AM/PM) : | 825 | 605 | 65  | 410 |   | 1,905                             |

" K " FACTOR :

**0.090**

INTERSECTION ADT ( V ) = TOTAL DAILY APPROACH VOLUME :

**21,167**

TOTAL # OF CRASHES :

**40**

# OF YEARS :

**5**

AVERAGE # OF CRASHES PER YEAR ( A ) :

**8.00**

**CRASH RATE CALCULATION :**

**1.04**

RATE =  $\frac{(A * 1,000,000)}{(V * 365)}$

Comments : \_\_\_\_\_

Project Title & Date: \_\_\_\_\_

## INTERSECTION CRASH RATE WORKSHEET

CITY/TOWN : Newton, MA COUNT DATE : October 2017

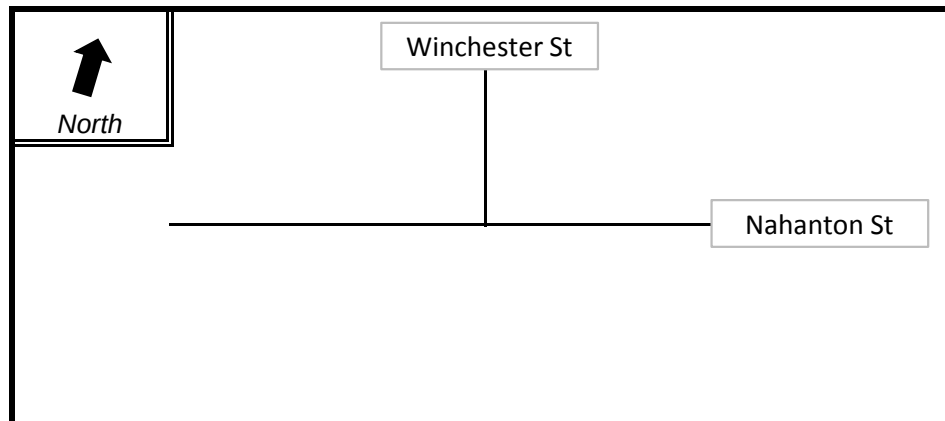
DISTRICT : 6 UNSIGNALIZED :  SIGNALIZED :  0.70

### ~ INTERSECTION DATA ~

MAJOR STREET : Nahanton Street

MINOR STREET(S) : Winchester Street

**INTERSECTION  
DIAGRAM**  
(Label Approaches)



### PEAK HOUR VOLUMES

|                               |     |     |    |     |   |                                   |
|-------------------------------|-----|-----|----|-----|---|-----------------------------------|
| APPROACH :                    | 1   | 2   | 3  | 4   | 5 | Total Peak Hourly Approach Volume |
| DIRECTION :                   | EB  | WB  | NB | SB  |   |                                   |
| PEAK HOURLY VOLUMES (AM/PM) : | 900 | 450 |    | 365 |   | 1,715                             |

" K " FACTOR :

**0.090**

INTERSECTION ADT ( V ) = TOTAL DAILY APPROACH VOLUME :

**19,056**

TOTAL # OF CRASHES :

**17**

# OF YEARS :

**5**

AVERAGE # OF CRASHES PER YEAR ( A ) :

**3.40**

**CRASH RATE CALCULATION :**

**0.49**

RATE =  $\frac{(A * 1,000,000)}{(V * 365)}$

Comments : \_\_\_\_\_

Project Title & Date: \_\_\_\_\_

## INTERSECTION CRASH RATE WORKSHEET

CITY/TOWN : Newton, MA COUNT DATE : October 2017

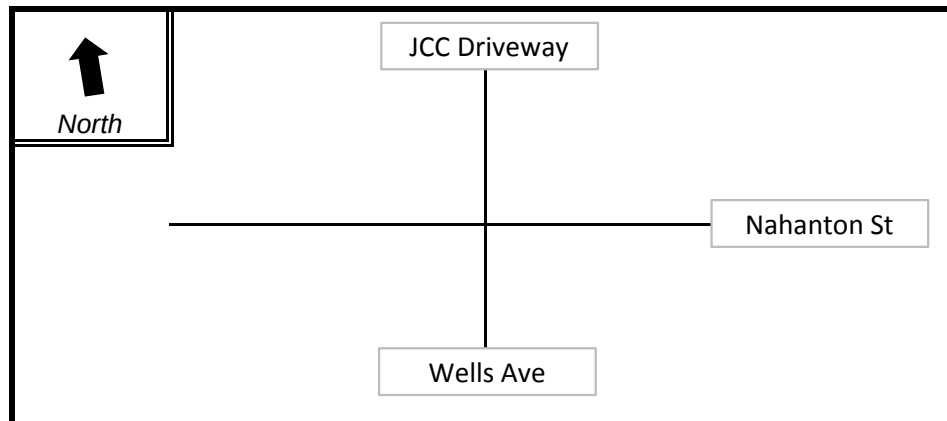
DISTRICT : 6 UNSIGNALIZED :  SIGNALIZED :  0.70

### ~ INTERSECTION DATA ~

MAJOR STREET : Nahanton Street

MINOR STREET(S) : Wells Avenue, JCC Driveway

**INTERSECTION  
DIAGRAM**  
(Label Approaches)



### PEAK HOUR VOLUMES

|                               |     |     |     |     |   |                                   |
|-------------------------------|-----|-----|-----|-----|---|-----------------------------------|
| APPROACH :                    | 1   | 2   | 3   | 4   | 5 | Total Peak Hourly Approach Volume |
| DIRECTION :                   | EB  | WB  | NB  | SB  |   |                                   |
| PEAK HOURLY VOLUMES (AM/PM) : | 620 | 750 | 745 | 175 |   | 2,290                             |

" K " FACTOR :

**0.090**

INTERSECTION ADT ( V ) = TOTAL DAILY APPROACH VOLUME :

**25,444**

TOTAL # OF CRASHES :

**20**

# OF YEARS :

**5**

AVERAGE # OF CRASHES PER YEAR ( A ) :

**4.00**

CRASH RATE CALCULATION :

**0.43**

RATE =  $\frac{(A * 1,000,000)}{(V * 365)}$

Comments : \_\_\_\_\_

Project Title & Date: \_\_\_\_\_

## INTERSECTION CRASH RATE WORKSHEET

CITY/TOWN : Needham, MA COUNT DATE : October 2017

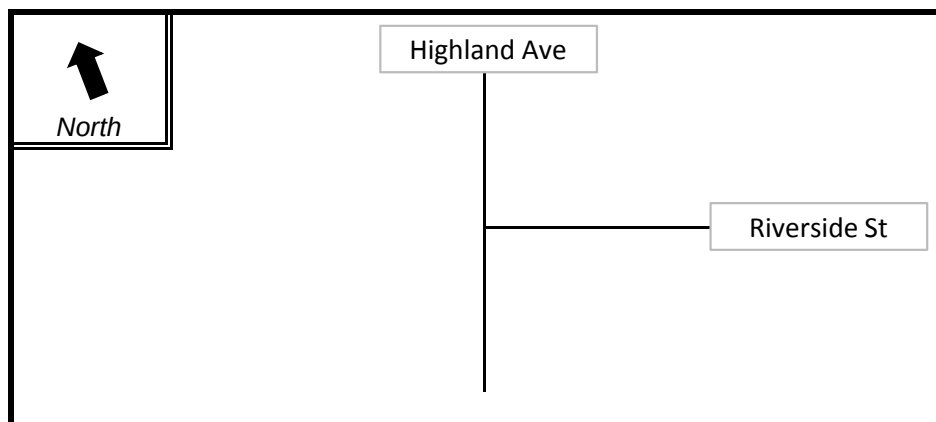
DISTRICT : 6 UNSIGNALIZED : ☒ 0.53 SIGNALIZED : ☐ 0.70

### ~ INTERSECTION DATA ~

MAJOR STREET : Highland Avenue

MINOR STREET(S) : Riverside Street

**INTERSECTION  
DIAGRAM**  
(Label Approaches)



### PEAK HOUR VOLUMES

|                               |     |     |     |   |   |                                   |
|-------------------------------|-----|-----|-----|---|---|-----------------------------------|
| APPROACH :                    | 1   | 2   | 3   | 4 | 5 | Total Peak Hourly Approach Volume |
| DIRECTION :                   | NEB | SWB | NWB | - |   |                                   |
| PEAK HOURLY VOLUMES (AM/PM) : | 730 | 880 | 10  |   |   | 1,620                             |

" K " FACTOR :

**0.090**

INTERSECTION ADT ( V ) = TOTAL DAILY APPROACH VOLUME :

**18,000**

TOTAL # OF CRASHES :

**19**

# OF YEARS :

**5**

AVERAGE # OF CRASHES PER YEAR ( A ) :

**3.80**

**CRASH RATE CALCULATION :**

**0.58**

RATE =  $\frac{(A * 1,000,000)}{(V * 365)}$

Comments : \_\_\_\_\_

Project Title & Date: \_\_\_\_\_

## INTERSECTION CRASH RATE WORKSHEET

CITY/TOWN : Needham, MA COUNT DATE : October 2017

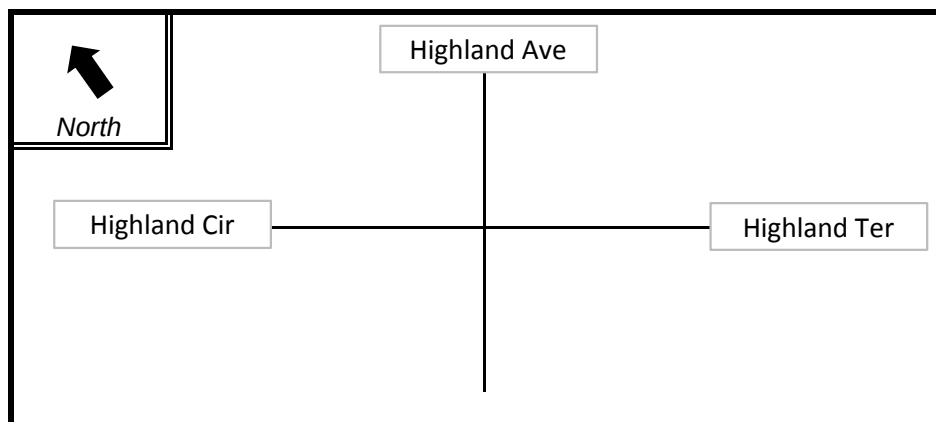
DISTRICT : 6 UNSIGNALIZED : ☒ 0.53 SIGNALIZED : ☐ 0.70

### ~ INTERSECTION DATA ~

MAJOR STREET : Highland Avenue

MINOR STREET(S) : Highland Terrace, Highland Circle

**INTERSECTION  
DIAGRAM**  
(Label Approaches)



### PEAK HOUR VOLUMES

|                               |     |     |     |     |   |                                   |
|-------------------------------|-----|-----|-----|-----|---|-----------------------------------|
| APPROACH :                    | 1   | 2   | 3   | 4   | 5 | Total Peak Hourly Approach Volume |
| DIRECTION :                   | NEB | SWB | NWB | SEB |   |                                   |
| PEAK HOURLY VOLUMES (AM/PM) : | 735 | 885 | 5   | 20  |   | 1,645                             |

" K " FACTOR :

**0.090**

INTERSECTION ADT ( V ) = TOTAL DAILY APPROACH VOLUME :

**18,278**

TOTAL # OF CRASHES :

15

# OF YEARS :

5

AVERAGE # OF CRASHES PER YEAR ( A ) :

**3.00**

CRASH RATE CALCULATION :

**0.45**

RATE =  $\frac{(A * 1,000,000)}{(V * 365)}$

Comments : \_\_\_\_\_

Project Title & Date: \_\_\_\_\_

## INTERSECTION CRASH RATE WORKSHEET

CITY/TOWN : Needham, MA COUNT DATE : May 2017

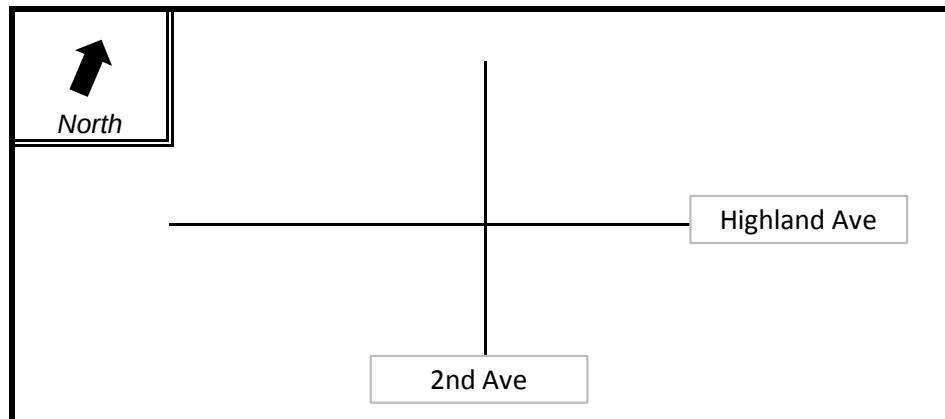
DISTRICT : 6 UNSIGNALIZED :  SIGNALIZED :  0.70

### ~ INTERSECTION DATA ~

MAJOR STREET : Highland Avenue

MINOR STREET(S) : 2nd Avenue

**INTERSECTION  
DIAGRAM**  
(Label Approaches)



### PEAK HOUR VOLUMES

|                               |     |     |     |     |   |                                   |
|-------------------------------|-----|-----|-----|-----|---|-----------------------------------|
| APPROACH :                    | 1   | 2   | 3   | 4   | 5 | Total Peak Hourly Approach Volume |
| DIRECTION :                   | EB  | WB  | NB  | SB  |   |                                   |
| PEAK HOURLY VOLUMES (AM/PM) : | 645 | 890 | 860 | 105 |   | 2,500                             |

" K " FACTOR :

**0.090**

INTERSECTION ADT ( V ) = TOTAL DAILY APPROACH VOLUME :

**27,778**

TOTAL # OF CRASHES :

26

# OF YEARS :

5

AVERAGE # OF CRASHES PER YEAR ( A ) :

**5.20**

**CRASH RATE CALCULATION :**

**0.51**

RATE =  $\frac{(A * 1,000,000)}{(V * 365)}$

Comments : \_\_\_\_\_

Project Title & Date: \_\_\_\_\_



## INTERSECTION CRASH RATE WORKSHEET

CITY/TOWN : Needham, MA COUNT DATE : October 2017

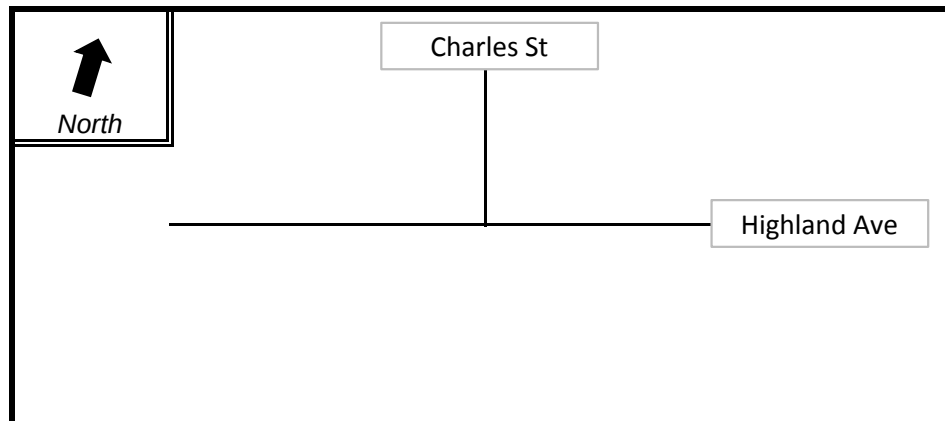
DISTRICT : 6 UNSIGNALIZED : ☒ 0.53 SIGNALIZED : ☐ 0.70

### ~ INTERSECTION DATA ~

MAJOR STREET : Highland Avenue

MINOR STREET(S) : Charles Street

**INTERSECTION  
DIAGRAM**  
(Label Approaches)



### PEAK HOUR VOLUMES

|                               |     |       |    |     |   |                                   |
|-------------------------------|-----|-------|----|-----|---|-----------------------------------|
| APPROACH :                    | 1   | 2     | 3  | 4   | 5 | Total Peak Hourly Approach Volume |
| DIRECTION :                   | EB  | WB    | NB | SB  |   |                                   |
| PEAK HOURLY VOLUMES (AM/PM) : | 690 | 1,440 |    | 130 |   | 2,260                             |

" K " FACTOR :

**0.090**

INTERSECTION ADT ( V ) = TOTAL DAILY APPROACH VOLUME :

**25,111**

TOTAL # OF CRASHES :

**11**

# OF YEARS :

**5**

AVERAGE # OF CRASHES PER YEAR ( A ) :

**2.20**

CRASH RATE CALCULATION :

**0.24**

RATE =  $\frac{(A * 1,000,000)}{(V * 365)}$

Comments : \_\_\_\_\_

Project Title & Date: \_\_\_\_\_

## INTERSECTION CRASH RATE WORKSHEET

CITY/TOWN : Needham, MA COUNT DATE : October 2017

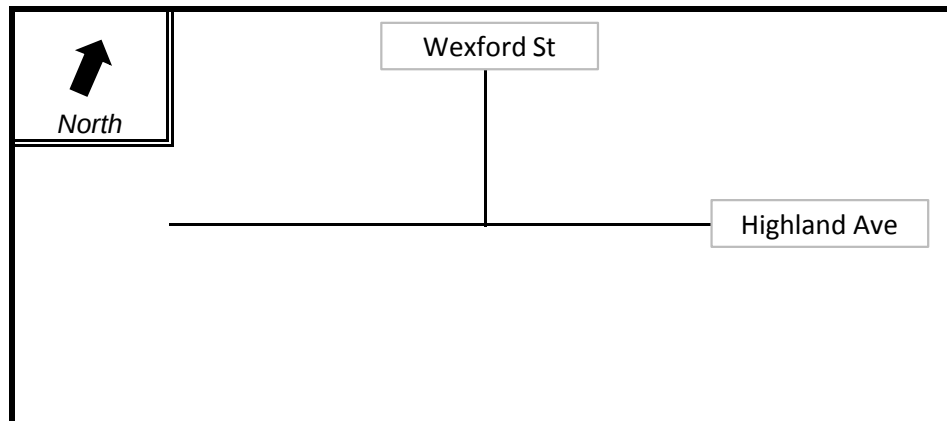
DISTRICT : 6 UNSIGNALIZED : ☒ 0.53 SIGNALIZED : ☐ 0.70

### ~ INTERSECTION DATA ~

MAJOR STREET : Highland Avenue

MINOR STREET(S) : Wexford Street

**INTERSECTION  
DIAGRAM**  
(Label Approaches)



### PEAK HOUR VOLUMES

|                               |     |       |    |     |   |                                   |
|-------------------------------|-----|-------|----|-----|---|-----------------------------------|
| APPROACH :                    | 1   | 2     | 3  | 4   | 5 | Total Peak Hourly Approach Volume |
| DIRECTION :                   | EB  | WB    | NB | SB  |   |                                   |
| PEAK HOURLY VOLUMES (AM/PM) : | 770 | 1,450 |    | 230 |   | 2,450                             |

" K " FACTOR :

**0.090**

INTERSECTION ADT ( V ) = TOTAL DAILY APPROACH VOLUME :

**27,222**

TOTAL # OF CRASHES :

**37**

# OF YEARS :

**5**

AVERAGE # OF CRASHES PER YEAR ( A ) :

**7.40**

CRASH RATE CALCULATION :

**0.74**

RATE =  $\frac{(A * 1,000,000)}{(V * 365)}$

Comments : \_\_\_\_\_

Project Title & Date: \_\_\_\_\_

## INTERSECTION CRASH RATE WORKSHEET

CITY/TOWN : Needham, MA COUNT DATE : May 2017

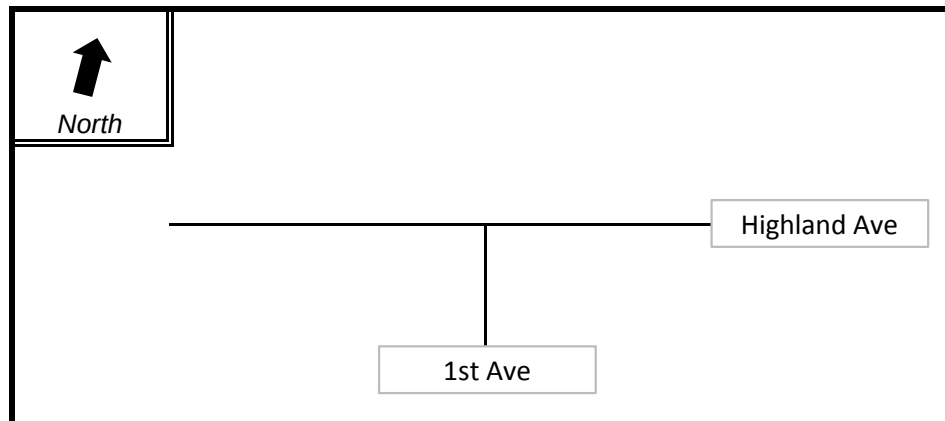
DISTRICT : 6 UNSIGNALIZED : ☒ 0.53 SIGNALIZED : ☐ 0.70

### ~ INTERSECTION DATA ~

MAJOR STREET : Highland Avenue

MINOR STREET(S) : 1st Avenue

**INTERSECTION  
DIAGRAM**  
(Label Approaches)



### PEAK HOUR VOLUMES

|                               |     |       |    |    |   |                                   |
|-------------------------------|-----|-------|----|----|---|-----------------------------------|
| APPROACH :                    | 1   | 2     | 3  | 4  | 5 | Total Peak Hourly Approach Volume |
| DIRECTION :                   | EB  | WB    | NB | SB |   |                                   |
| PEAK HOURLY VOLUMES (AM/PM) : | 880 | 1,635 | 85 | 20 |   | 2,620                             |

" K " FACTOR :

**0.090**

INTERSECTION ADT ( V ) = TOTAL DAILY APPROACH VOLUME :

**29,111**

TOTAL # OF CRASHES :

**34**

# OF YEARS :

**5**

AVERAGE # OF CRASHES PER YEAR ( A ) :

**6.80**

CRASH RATE CALCULATION :

**0.64**

RATE =  $\frac{(A * 1,000,000)}{(V * 365)}$

Comments : \_\_\_\_\_

Project Title & Date: \_\_\_\_\_

## INTERSECTION CRASH RATE WORKSHEET

CITY/TOWN : Needham, MA COUNT DATE : January 2018

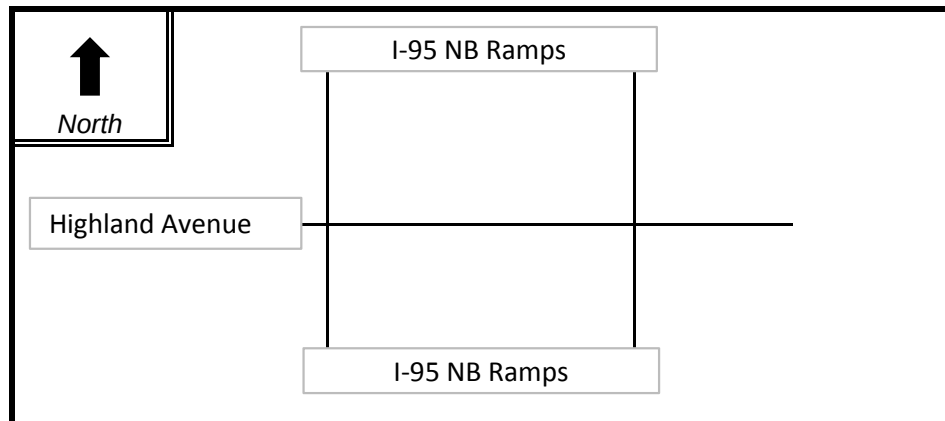
DISTRICT : 6 UNSIGNALIZED : ☒ 0.53 SIGNALIZED : ☐ 0.70

### ~ INTERSECTION DATA ~

MAJOR STREET : Highland Avenue

MINOR STREET(S) : I-95 NB Ramps

**INTERSECTION  
DIAGRAM**  
(Label Approaches)



### PEAK HOUR VOLUMES

|                               |       |     |     |    |   |                                   |
|-------------------------------|-------|-----|-----|----|---|-----------------------------------|
| APPROACH :                    | 1     | 2   | 3   | 4  | 5 | Total Peak Hourly Approach Volume |
| DIRECTION :                   | EB    | WB  | NB  | SB |   |                                   |
| PEAK HOURLY VOLUMES (AM/PM) : | 1,690 | 930 | 270 | 90 |   | 2,980                             |

" K " FACTOR :

**0.090**

INTERSECTION ADT ( V ) = TOTAL DAILY APPROACH VOLUME :

**33,111**

TOTAL # OF CRASHES :

32

# OF YEARS :

5

AVERAGE # OF CRASHES PER YEAR ( A ) :

**6.40**

CRASH RATE CALCULATION :

**0.53**

$$\text{RATE} = \frac{(A * 1,000,000)}{(V * 365)}$$

Comments : \_\_\_\_\_

Project Title & Date: \_\_\_\_\_

## INTERSECTION CRASH RATE WORKSHEET

CITY/TOWN : Needham, MA COUNT DATE : January 2018

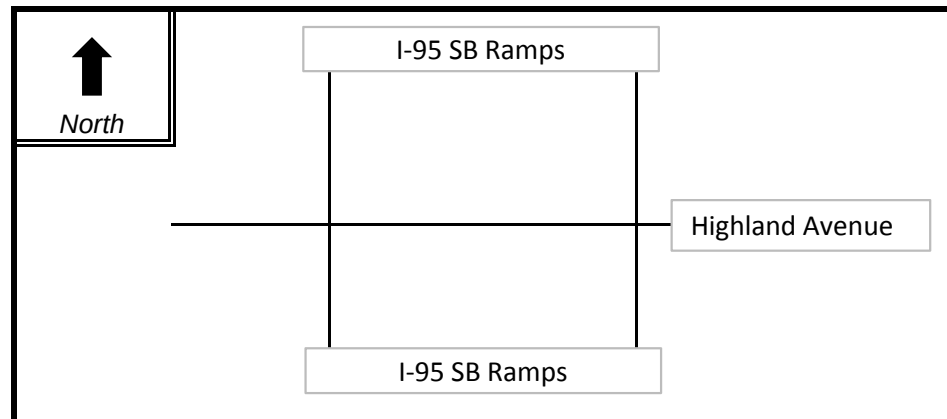
DISTRICT : 6 UNSIGNALIZED : ☒ 0.53 SIGNALIZED : ☐ 0.70

### ~ INTERSECTION DATA ~

MAJOR STREET : Highland Avenue

MINOR STREET(S) : I-95 SB Ramps

**INTERSECTION  
DIAGRAM**  
(Label Approaches)



### PEAK HOUR VOLUMES

| APPROACH :                    | 1     | 2   | 3   | 4   | 5 | Total Peak Hourly Approach Volume |
|-------------------------------|-------|-----|-----|-----|---|-----------------------------------|
| DIRECTION :                   | EB    | WB  | NB  | SB  |   |                                   |
| PEAK HOURLY VOLUMES (AM/PM) : | 1,055 | 715 | 750 | 530 |   | 3,050                             |

" K " FACTOR :

**0.090**

INTERSECTION ADT ( V ) = TOTAL DAILY APPROACH VOLUME :

**33,889**

TOTAL # OF CRASHES :

**8**

# OF YEARS :

**5**

AVERAGE # OF CRASHES PER YEAR ( A ) :

**1.60**

**CRASH RATE CALCULATION :**

**0.13**

RATE =  $\frac{(A * 1,000,000)}{(V * 365)}$

Comments : \_\_\_\_\_

Project Title & Date: \_\_\_\_\_





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## Planned / Approved Project-Generated Traffic Volumes









BACKGROUND DEVELOPMENTS

Project Name: Northland - Needham Street  
Project No: 12239.00

|                                                                            |          | ROADWAY AND BACKGROUND DEVELOPMENTS |    |     |              |    |     |                                    |    |     |                  |    |     |                |    |     |                                   |    |     |                                          |    |     |                  |    |     |                                               |    |     |                                     |    |     |                                  |     |     |
|----------------------------------------------------------------------------|----------|-------------------------------------|----|-----|--------------|----|-----|------------------------------------|----|-----|------------------|----|-----|----------------|----|-----|-----------------------------------|----|-----|------------------------------------------|----|-----|------------------|----|-----|-----------------------------------------------|----|-----|-------------------------------------|----|-----|----------------------------------|-----|-----|
| INTERSECTION                                                               | MOVEMENT | 1st Avenue<br>Reconfiguration       |    |     | Newton Nexus |    |     | 49 Winchester Street - Day<br>Care |    |     | 180 Wells Avenue |    |     | 2 Wells Avenue |    |     | The Kendrick (A St at 2nd<br>Ave) |    |     | Needham Hotel Proposal -<br>156 B Street |    |     | NBC Universal HQ |    |     | Re-Occupancy of<br>Northland Light Industrial |    |     | Full Occupancy of<br>Northland Site |    |     | TOTAL BACKGROUND<br>DEVELOPMENTS |     |     |
|                                                                            |          | AM                                  | PM | SAT | AM           | PM | SAT | AM                                 | PM | SAT | AM               | PM | SAT | AM             | PM | SAT | AM                                | PM | SAT | AM                                       | PM | SAT | AM               | PM | SAT | AM                                            | PM | SAT | AM                                  | PM | SAT |                                  |     |     |
| 11. NEEDHAM STREET AT JACONNET STREET<br>Jaconnet Street                   | WB L     |                                     |    |     |              |    |     |                                    |    |     |                  |    |     |                |    |     |                                   |    |     |                                          |    |     |                  |    |     |                                               |    |     |                                     |    |     |                                  |     |     |
| Needham Street                                                             | WB R     |                                     |    |     |              |    |     |                                    |    |     |                  |    |     |                |    |     |                                   |    |     |                                          |    |     |                  |    |     |                                               |    |     |                                     |    |     |                                  |     |     |
|                                                                            | NB T     |                                     |    |     | 62           | 68 | 83  | 8                                  | 6  | 1   |                  |    |     |                |    |     | 16                                | 11 | 15  | 4                                        | 6  | 7   | 4                | 27 | 7   | 2                                             | 10 | 6   | 5                                   | 41 | 10  | 101                              | 169 | 129 |
| Needham Street                                                             | NB R     |                                     |    |     |              |    |     |                                    |    |     |                  |    |     |                |    |     |                                   |    |     |                                          |    |     |                  |    |     |                                               |    |     |                                     |    |     |                                  |     |     |
|                                                                            | SB L     |                                     |    |     |              |    |     |                                    |    |     |                  |    |     |                |    |     |                                   |    |     |                                          |    |     |                  |    |     |                                               |    |     |                                     |    |     |                                  |     |     |
|                                                                            | SB T     |                                     |    |     | 20           | 95 | 77  | 6                                  | 8  | 1   |                  |    |     |                |    |     | 6                                 | 17 | 14  | 6                                        | 6  | 9   | 27               | 5  | 8   | 12                                            | 1  | 6   | 46                                  | 7  | 13  | 123                              | 139 | 128 |
| 12. NEEDHAM STREET AT ROCKLAND STREET<br>Rockland Street                   | WB L     |                                     |    |     |              |    |     |                                    |    |     |                  |    |     |                |    |     |                                   |    |     |                                          |    |     |                  |    |     |                                               |    |     |                                     |    |     |                                  |     |     |
| Needham Street                                                             | WB R     |                                     |    |     |              |    |     |                                    |    |     |                  |    |     |                |    |     |                                   |    |     |                                          |    |     |                  |    |     |                                               |    |     |                                     |    |     |                                  |     |     |
|                                                                            | NB T     |                                     |    |     | 18           | 92 | 74  | 8                                  | 6  | 1   |                  |    |     |                |    |     | 16                                | 11 | 15  | 4                                        | 6  | 7   | 4                | 27 | 7   | 2                                             | 10 | 6   | 5                                   | 41 | 10  | 57                               | 193 | 120 |
| Needham Street                                                             | NB R     |                                     |    |     |              |    |     |                                    |    |     |                  |    |     |                |    |     |                                   |    |     |                                          |    |     |                  |    |     |                                               |    |     |                                     |    |     |                                  |     |     |
|                                                                            | SB L     |                                     |    |     |              |    |     |                                    |    |     |                  |    |     |                |    |     |                                   |    |     |                                          |    |     |                  |    |     |                                               |    |     |                                     |    |     |                                  |     |     |
|                                                                            | SB T     |                                     |    |     | 59           | 65 | 79  | 6                                  | 8  | 1   |                  |    |     |                |    |     | 6                                 | 17 | 14  | 6                                        | 6  | 9   | 27               | 5  | 8   | 12                                            | 1  | 6   | 46                                  | 7  | 13  | 162                              | 109 | 130 |
| 13. NEEDHAM STREET AT COLUMBIA AVENUE / AVALON DRIVEWAY<br>Avalon Driveway | EB L     |                                     |    |     |              |    |     |                                    |    |     |                  |    |     |                |    |     |                                   |    |     |                                          |    |     |                  |    |     |                                               |    |     |                                     |    |     |                                  |     |     |
|                                                                            | EB T     |                                     |    |     |              |    |     |                                    |    |     |                  |    |     |                |    |     |                                   |    |     |                                          |    |     |                  |    |     |                                               |    |     |                                     |    |     |                                  |     |     |
| Columbia Avenue                                                            | EB R     |                                     |    |     |              |    |     |                                    |    |     |                  |    |     |                |    |     |                                   |    |     |                                          |    |     |                  |    |     |                                               |    |     |                                     |    |     |                                  |     |     |
|                                                                            | WB L     |                                     |    |     |              |    |     |                                    |    |     |                  |    |     |                |    |     |                                   |    |     |                                          |    |     |                  |    |     |                                               |    |     |                                     |    |     |                                  |     |     |
|                                                                            | WB T     |                                     |    |     |              |    |     |                                    |    |     |                  |    |     |                |    |     |                                   |    |     |                                          |    |     |                  |    |     |                                               |    |     |                                     |    |     |                                  |     |     |
| Needham Street                                                             | WB R     |                                     |    |     |              |    |     |                                    |    |     |                  |    |     |                |    |     |                                   |    |     |                                          |    |     |                  |    |     |                                               |    |     |                                     |    |     |                                  |     |     |
|                                                                            | NB L     |                                     |    |     |              |    |     |                                    |    |     |                  |    |     |                |    |     |                                   |    |     |                                          |    |     |                  |    |     |                                               |    |     |                                     |    |     |                                  |     |     |
|                                                                            | NB T     |                                     |    |     | 18           | 92 | 74  | 8                                  | 6  | 1   |                  |    |     |                |    |     | 16                                | 11 | 15  | 4                                        | 6  | 7   | 4                | 27 | 7   | 2                                             | 10 | 6   | 5                                   | 41 | 10  | 57                               | 193 | 120 |
| Needham Street                                                             | NB R     |                                     |    |     |              |    |     |                                    |    |     |                  |    |     |                |    |     |                                   |    |     |                                          |    |     |                  |    |     |                                               |    |     |                                     |    |     |                                  |     |     |
|                                                                            | SB L     |                                     |    |     |              |    |     |                                    |    |     |                  |    |     |                |    |     |                                   |    |     |                                          |    |     |                  |    |     |                                               |    |     |                                     |    |     |                                  |     |     |
|                                                                            | SB T     |                                     |    |     | 59           | 65 | 79  | 6                                  | 8  | 1   |                  |    |     |                |    |     | 6                                 | 17 | 14  | 6                                        | 6  | 9   | 27               | 5  | 8   | 12                                            | 1  | 6   | 46                                  | 7  | 13  | 162                              | 109 | 130 |
|                                                                            | SB R     |                                     |    |     |              |    |     |                                    |    |     |                  |    |     |                |    |     |                                   |    |     |                                          |    |     |                  |    |     |                                               |    |     |                                     |    |     |                                  |     |     |
| 14. WINCHESTER STREET AT NEEDHAM STREET / DEDHAM STREET<br>Needham Street  | EB L     |                                     |    |     | 14           | 75 | 60  | 8                                  | 6  | 1   |                  |    |     |                |    |     | 16                                | 11 | 15  | 4                                        | 6  | 7   | 4                | 27 | 7   | 1                                             | 9  | 6   | 5                                   | 37 | 9   | 52                               | 171 | 105 |
|                                                                            | EB T     |                                     |    |     | 3            | 13 | 11  |                                    |    |     |                  |    |     |                |    |     |                                   |    |     |                                          |    |     |                  |    |     |                                               |    |     | 1                                   | 3  | 14  | 11                               |     |     |
|                                                                            | EB R     |                                     |    |     | 1            | 4  | 3   |                                    |    |     |                  |    |     |                |    |     |                                   |    |     |                                          |    |     |                  |    |     |                                               |    | 1   |                                     | 3  | 8   | 4                                |     |     |
| Dedham Street                                                              | WB L     |                                     |    |     |              |    |     |                                    |    |     |                  |    |     |                |    |     |                                   |    |     |                                          |    |     |                  |    |     |                                               |    |     |                                     |    |     |                                  |     |     |
|                                                                            | WB T     |                                     |    |     | 9            | 9  | 11  |                                    |    |     |                  |    |     |                |    |     |                                   |    |     |                                          |    |     |                  |    |     |                                               |    |     |                                     |    |     |                                  |     |     |
|                                                                            | WB R     |                                     |    |     |              |    |     |                                    |    |     |                  |    |     |                |    |     |                                   |    |     |                                          |    |     |                  |    |     |                                               |    |     |                                     |    |     |                                  |     |     |
| Winchester Street                                                          | NB L     |                                     |    |     | 2            | 3  | 3   |                                    |    |     |                  |    |     |                |    |     |                                   |    |     |                                          |    |     |                  |    |     |                                               |    |     |                                     |    |     |                                  |     |     |
|                                                                            | NB T     |                                     |    |     |              |    |     |                                    |    |     |                  |    |     |                |    |     |                                   |    |     |                                          |    |     |                  |    |     |                                               |    |     |                                     |    |     |                                  |     |     |
|                                                                            | NB R     |                                     |    |     |              |    |     |                                    |    |     |                  |    |     |                |    |     |                                   |    |     |                                          |    |     |                  |    |     |                                               |    |     |                                     |    |     |                                  |     |     |
| Winchester Street                                                          | SB L     |                                     |    |     |              |    |     |                                    |    |     |                  |    |     |                |    |     |                                   |    |     |                                          |    |     |                  |    |     |                                               |    |     |                                     |    |     |                                  |     |     |
|                                                                            | SB T     |                                     |    |     |              |    |     |                                    |    |     |                  |    |     |                |    |     |                                   |    |     |                                          |    |     |                  |    |     |                                               |    |     |                                     |    |     |                                  |     |     |
|                                                                            | SB R     |                                     |    |     | 48           | 53 | 65  | 6                                  | 8  | 1   |                  |    |     |                |    |     | 35                                | 10 | 7   | 26                                       | 2  | 4   |                  |    |     |                                               |    |     |                                     |    |     |                                  |     |     |
|                                                                            |          |                                     |    |     |              |    |     |                                    |    |     |                  |    |     |                |    |     |                                   |    |     |                                          |    |     |                  |    |     |                                               |    |     |                                     |    |     |                                  |     |     |
|                                                                            |          |                                     |    |     |              |    |     |                                    |    |     |                  |    |     |                |    |     |                                   |    |     |                                          |    |     |                  |    |     |                                               |    |     |                                     |    |     |                                  |     |     |
|                                                                            |          |                                     |    |     |              |    |     |                                    |    |     |                  |    |     |                |    |     |                                   |    |     |                                          |    |     |                  |    |     |                                               |    |     |                                     |    |     |                                  |     |     |
|                                                                            |          |                                     |    |     |              |    |     |                                    |    |     |                  |    |     |                |    |     |                                   |    |     |                                          |    |     |                  |    |     |                                               |    |     |                                     |    |     |                                  |     |     |
|                                                                            |          |                                     |    |     |              |    |     |                                    |    |     |                  |    |     |                |    |     |                                   |    |     |                                          |    |     |                  |    |     |                                               |    |     |                                     |    |     |                                  |     |     |
|                                                                            |          |                                     |    |     |              |    |     |                                    |    |     |                  |    |     |                |    |     |                                   |    |     |                                          |    |     |                  |    |     |                                               |    |     |                                     |    |     |                                  |     |     |
|                                                                            |          |                                     |    |     |              |    |     |                                    |    |     |                  |    |     |                |    |     |                                   |    |     |                                          |    |     |                  |    |     |                                               |    |     |                                     |    |     |                                  |     |     |
|                                                                            |          |                                     |    |     |              |    |     |                                    |    |     |                  |    |     |                |    |     |                                   |    |     |                                          |    |     |                  |    |     |                                               |    |     |                                     |    |     |                                  |     |     |
|                                                                            |          |                                     |    |     |              |    |     |                                    |    |     |                  |    |     |                |    |     |                                   |    |     |                                          |    |     |                  |    |     |                                               |    |     |                                     |    |     |                                  |     |     |
|                                                                            |          |                                     |    |     |              |    |     |                                    |    |     |                  |    |     |                |    |     |                                   |    |     |                                          |    |     |                  |    |     |                                               |    |     |                                     |    |     |                                  |     |     |
|                                                                            |          |                                     |    |     |              |    |     |                                    |    |     |                  |    |     |                |    |     |                                   |    |     |                                          |    |     |                  |    |     |                                               |    |     |                                     |    |     |                                  |     |     |
|                                                                            |          |                                     |    |     |              |    |     |                                    |    |     |                  |    |     |                |    |     |                                   |    |     |                                          |    |     |                  |    |     |                                               |    |     |                                     |    |     |                                  |     |     |
|                                                                            |          |                                     |    |     |              |    |     |                                    |    |     |                  |    |     |                |    |     |                                   |    |     |                                          |    |     |                  |    |     |                                               |    |     |                                     |    |     |                                  |     |     |
|                                                                            |          |                                     |    |     |              |    |     |                                    |    |     |                  |    |     |                |    |     |                                   |    |     |                                          |    |     |                  |    |     |                                               |    |     |                                     |    |     |                                  |     |     |
|                                                                            |          |                                     |    |     |              |    |     |                                    |    |     |                  |    |     |                |    |     |                                   |    |     |                                          |    |     |                  |    |     |                                               |    |     |                                     |    |     |                                  |     |     |
|                                                                            |          |                                     |    |     |              |    |     |                                    |    |     |                  |    |     |                |    |     |                                   |    |     |                                          |    |     |                  |    |     |                                               |    |     |                                     |    |     |                                  |     |     |
|                                                                            |          |                                     |    |     |              |    |     |                                    |    |     |                  |    |     |                |    |     |                                   |    |     |                                          |    |     |                  |    |     |                                               |    |     |                                     |    |     |                                  |     |     |
|                                                                            |          |                                     |    |     |              |    |     |                                    |    |     |                  |    |     |                |    |     |                                   |    |     |                                          |    |     |                  |    |     |                                               |    |     |                                     |    |     |                                  |     |     |
|                                                                            |          |                                     |    |     |              |    |     |                                    |    |     |                  |    |     |                |    |     |                                   |    |     |                                          |    |     |                  |    |     |                                               |    |     |                                     |    |     |                                  |     |     |
|                                                                            |          |                                     |    |     |              |    |     |                                    |    |     |                  |    |     |                |    |     |                                   |    |     |                                          |    |     |                  |    |     |                                               |    |     |                                     |    |     |                                  |     |     |
|                                                                            |          |                                     |    |     |              |    |     |                                    |    |     |                  |    |     |                |    |     |                                   |    |     |                                          |    |     |                  |    |     |                                               |    |     |                                     |    |     |                                  |     |     |
|                                                                            |          |                                     |    |     |              |    |     |                                    |    |     |                  |    |     |                |    |     |                                   |    |     |                                          |    |     |                  |    |     |                                               |    |     |                                     |    |     |                                  |     |     |
|                                                                            |          |                                     |    |     |              |    |     |                                    |    |     |                  |    |     |                |    |     |                                   |    |     |                                          |    |     |                  |    |     |                                               |    |     |                                     |    |     |                                  |     |     |
|                                                                            |          |                                     |    |     |              |    |     |                                    |    |     |                  |    |     |                |    |     |                                   |    |     |                                          |    |     |                  |    |     |                                               |    |     |                                     |    |     |                                  |     |     |
|                                                                            |          |                                     |    |     |              |    |     |                                    |    |     |                  |    |     |                |    |     |                                   |    |     |                                          |    |     |                  |    |     |                                               |    |     |                                     |    |     |                                  |     |     |
|                                                                            |          |                                     |    |     |              |    |     |                                    |    |     |                  |    |     |                |    |     |                                   |    |     |                                          |    |     |                  |    |     |                                               |    |     |                                     |    |     |                                  |     |     |
|                                                                            |          |                                     |    |     |              |    |     |                                    |    |     |                  |    |     |                |    |     |                                   |    |     |                                          |    |     |                  |    |     |                                               |    |     |                                     |    |     |                                  |     |     |
|                                                                            |          |                                     |    |     |              |    |     |                                    |    |     |                  |    |     |                |    |     |                                   |    |     |                                          |    |     |                  |    |     |                                               |    |     |                                     |    |     |                                  |     |     |
|                                                                            |          |                                     |    |     |              |    |     |                                    |    |     |                  |    |     |                |    |     |                                   |    |     |                                          |    |     |                  |    |     |                                               |    |     |                                     |    |     |                                  |     |     |
|                                                                            |          |                                     |    |     |              |    |     |                                    |    |     |                  |    |     |                |    |     |                                   |    |     |                                          |    |     |                  |    |     |                                               |    |     |                                     |    |     |                                  |     |     |
|                                                                            |          |                                     |    |     |              |    |     |                                    |    |     |                  |    |     |                |    |     |                                   |    |     |                                          |    |     |                  |    |     |                                               |    |     |                                     |    |     |                                  |     |     |



BACKGROUND DEVELOPMENTS

Project Name: Northland - Needham Street  
Project No: 12239.00

|                                                      |          | ROADWAY AND BACKGROUND DEVELOPMENTS |      |      |              |    |     |                                    |    |     |                  |    |     |                |    |     |                                   |    |     |                                          |    |     |                  |    |     |                                               |    |     |                                     |    |     |                                  |      |      |    |
|------------------------------------------------------|----------|-------------------------------------|------|------|--------------|----|-----|------------------------------------|----|-----|------------------|----|-----|----------------|----|-----|-----------------------------------|----|-----|------------------------------------------|----|-----|------------------|----|-----|-----------------------------------------------|----|-----|-------------------------------------|----|-----|----------------------------------|------|------|----|
| INTERSECTION                                         | MOVEMENT | 1st Avenue<br>Reconfiguration       |      |      | Newton Nexus |    |     | 49 Winchester Street - Day<br>Care |    |     | 180 Wells Avenue |    |     | 2 Wells Avenue |    |     | The Kendrick (A St at 2nd<br>Ave) |    |     | Needham Hotel Proposal -<br>156 B Street |    |     | NBC Universal HQ |    |     | Re-Occupancy of<br>Northland Light Industrial |    |     | Full Occupancy of<br>Northland Site |    |     | TOTAL BACKGROUND<br>DEVELOPMENTS |      |      |    |
|                                                      |          | AM                                  | PM   | SAT  | AM           | PM | SAT | AM                                 | PM | SAT | AM               | PM | SAT | AM             | PM | SAT | AM                                | PM | SAT | AM                                       | PM | SAT | AM               | PM | SAT | AM                                            | PM | SAT | AM                                  | PM | SAT |                                  |      |      |    |
| 22. HIGHLAND AVENUE AT 2ND AVENUE / STAPLES DRIVEWAY |          |                                     |      |      |              |    |     |                                    |    |     |                  |    |     |                |    |     |                                   |    |     |                                          |    |     |                  |    |     |                                               |    |     |                                     |    |     |                                  |      |      |    |
| Highland Avenue                                      | EB L     |                                     |      |      | 51           | 56 | 69  | 8                                  | 6  | 1   |                  |    |     |                |    |     | 5                                 | 16 | 13  | 6                                        | 6  | 8   | 26               | 5  | 8   | 19                                            | 2  | 9   | 72                                  | 12 | 20  | 150                              | 76   | 99   |    |
| Highland Avenue                                      | EB T     |                                     |      |      |              |    |     |                                    |    |     |                  |    |     |                |    |     | 7                                 | 20 | 17  | 7                                        | 7  | 10  | 32               | 6  | 10  |                                               |    |     |                                     |    |     | 37                               | 27   | 29   |    |
| Highland Avenue                                      | EB R     |                                     |      |      |              |    |     |                                    |    |     |                  |    |     |                |    |     |                                   |    |     |                                          |    |     |                  |    |     |                                               |    |     |                                     |    |     |                                  | 46   | 33   | 37 |
| Highland Avenue                                      | WB L     |                                     |      |      |              |    |     |                                    |    |     |                  |    |     |                |    |     |                                   |    |     |                                          |    |     |                  |    |     |                                               |    |     |                                     |    |     |                                  | 34   | 165  | 89 |
| Highland Avenue                                      | WB T     |                                     |      |      | 16           | 78 | 63  | 6                                  | 8  | 1   |                  |    |     |                |    |     |                                   |    |     |                                          |    |     |                  |    |     | 3                                             | 15 | 10  | 9                                   | 64 | 15  |                                  |      |      |    |
| Highland Avenue                                      | WB R     |                                     |      |      |              |    |     |                                    |    |     |                  |    |     |                |    |     |                                   |    |     |                                          |    |     |                  |    |     |                                               |    |     |                                     |    |     |                                  |      |      |    |
| 2nd Avenue                                           | NB L     | -210                                | -425 | -155 |              |    |     |                                    |    |     |                  |    |     |                |    |     | 15                                | 10 | 14  | 4                                        | 5  | 7   | 4                | 25 | 7   |                                               |    |     |                                     |    |     | -187                             | -385 | -127 |    |
| Highland Avenue                                      | NB T     |                                     |      |      |              |    |     |                                    |    |     |                  |    |     |                |    |     |                                   |    |     |                                          |    |     |                  |    |     |                                               |    |     |                                     |    |     |                                  |      |      |    |
| Highland Avenue                                      | NB R     |                                     |      |      |              |    |     |                                    |    |     |                  |    |     |                |    |     | 19                                | 13 | 17  | 5                                        | 7  | 8   | 5                | 32 | 8   |                                               |    |     |                                     |    |     | 29                               | 52   | 33   |    |
| Staples Driveway                                     | SB L     |                                     |      |      |              |    |     |                                    |    |     |                  |    |     |                |    |     |                                   |    |     |                                          |    |     |                  |    |     |                                               |    |     |                                     |    |     |                                  |      |      |    |
| Staples Driveway                                     | SB T     |                                     |      |      |              |    |     |                                    |    |     |                  |    |     |                |    |     |                                   |    |     |                                          |    |     |                  |    |     |                                               |    |     |                                     |    |     |                                  |      |      |    |
| Staples Driveway                                     | SB R     |                                     |      |      |              |    |     |                                    |    |     |                  |    |     |                |    |     |                                   |    |     |                                          |    |     |                  |    |     |                                               |    |     |                                     |    |     |                                  |      |      |    |
| 23. HIGHLAND AVENUE AT CHARLES STREET                |          |                                     |      |      |              |    |     |                                    |    |     |                  |    |     |                |    |     |                                   |    |     |                                          |    |     |                  |    |     |                                               |    |     |                                     |    |     |                                  |      |      |    |
| Highland Avenue                                      | EB U     |                                     |      |      |              |    |     |                                    |    |     |                  |    |     |                |    |     |                                   |    |     |                                          |    |     |                  |    |     |                                               |    |     |                                     |    |     |                                  |      |      |    |
| Highland Avenue                                      | EB L     |                                     |      |      |              |    |     |                                    |    |     |                  |    |     |                |    |     |                                   |    |     |                                          |    |     |                  |    |     |                                               |    |     |                                     |    |     |                                  |      |      |    |
| Highland Avenue                                      | EB T     | -210                                | -425 | -155 | 51           | 56 | 69  | 8                                  | 6  | 1   |                  |    |     |                |    |     | 5                                 | 16 | 13  | 6                                        | 6  | 8   | 26               | 5  | 8   | 19                                            | 2  | 9   | 72                                  | 12 | 20  | 187                              | 103  | 128  |    |
| Highland Avenue                                      | WB T     |                                     |      |      | 16           | 78 | 63  | 6                                  | 8  | 1   |                  |    |     |                |    |     | 15                                | 10 | 14  | 4                                        | 5  | 7   | 4                | 25 | 7   | 3                                             | 15 | 10  | 9                                   | 64 | 15  | -153                             | -220 | -38  |    |
| Highland Avenue                                      | WB R     |                                     |      |      |              |    |     |                                    |    |     |                  |    |     |                |    |     |                                   |    |     |                                          |    |     |                  |    |     |                                               |    |     |                                     |    |     |                                  |      |      |    |
| Charles Street                                       | SB L     |                                     |      |      |              |    |     |                                    |    |     |                  |    |     |                |    |     |                                   |    |     |                                          |    |     |                  |    |     |                                               |    |     |                                     |    |     |                                  |      |      |    |
| Charles Street                                       | SB R     |                                     |      |      |              |    |     |                                    |    |     |                  |    |     |                |    |     |                                   |    |     |                                          |    |     |                  |    |     |                                               |    |     |                                     |    |     |                                  |      |      |    |
| 24. HIGHLAND AVENUE AT WEXFORD STREET                |          |                                     |      |      |              |    |     |                                    |    |     |                  |    |     |                |    |     |                                   |    |     |                                          |    |     |                  |    |     |                                               |    |     |                                     |    |     |                                  |      |      |    |
| Highland Avenue                                      | EB U     |                                     |      |      |              |    |     |                                    |    |     |                  |    |     |                |    |     |                                   |    |     |                                          |    |     |                  |    |     |                                               |    |     |                                     |    |     |                                  |      |      |    |
| Highland Avenue                                      | EB L     |                                     |      |      |              |    |     |                                    |    |     |                  |    |     |                |    |     |                                   |    |     |                                          |    |     |                  |    |     |                                               |    |     |                                     |    |     |                                  |      |      |    |
| Highland Avenue                                      | EB T     | -210                                | -425 | -155 | 51           | 56 | 69  | 8                                  | 6  | 1   |                  |    |     |                |    |     | 5                                 | 16 | 13  | 6                                        | 6  | 8   | 26               | 5  | 8   | 19                                            | 2  | 9   | 72                                  | 12 | 20  | 187                              | 103  | 128  |    |
| Highland Avenue                                      | WB T     |                                     |      |      | 16           | 78 | 63  | 6                                  | 8  | 1   |                  |    |     |                |    |     | 15                                | 10 | 14  | 4                                        | 5  | 7   | 4                | 25 | 7   | 3                                             | 15 | 10  | 9                                   | 64 | 15  | -153                             | -220 | -38  |    |
| Highland Avenue                                      | WB R     |                                     |      |      |              |    |     |                                    |    |     |                  |    |     |                |    |     |                                   |    |     |                                          |    |     |                  |    |     |                                               |    |     |                                     |    |     |                                  |      |      |    |
| Wexford Street                                       | SB L     |                                     |      |      |              |    |     |                                    |    |     |                  |    |     |                |    |     |                                   |    |     |                                          |    |     |                  |    |     |                                               |    |     |                                     |    |     |                                  |      |      |    |
| Wexford Street                                       | SB R     |                                     |      |      |              |    |     |                                    |    |     |                  |    |     |                |    |     |                                   |    |     |                                          |    |     |                  |    |     |                                               |    |     |                                     |    |     |                                  |      |      |    |
| 25. HIGHLAND AVENUE AT 1ST AVENUE / DRIVEWAY         |          |                                     |      |      |              |    |     |                                    |    |     |                  |    |     |                |    |     |                                   |    |     |                                          |    |     |                  |    |     |                                               |    |     |                                     |    |     |                                  |      |      |    |
| Highland Avenue                                      | EB L     |                                     |      |      | 51           | 56 | 69  | 8                                  | 6  | 1   |                  |    |     |                |    |     | 5                                 | 16 | 13  | 6                                        | 6  | 8   | 26               | 5  | 8   | 19                                            | 2  | 9   | 72                                  | 12 | 20  | 187                              | 103  | 128  |    |
| Highland Avenue                                      | EB T     |                                     |      |      |              |    |     |                                    |    |     |                  |    |     |                |    |     | 8                                 | 24 | 20  | 8                                        | 9  | 12  | 39               | 7  | 12  |                                               |    |     |                                     |    |     | 55                               | 40   | 44   |    |
| Highland Avenue                                      | EB R     |                                     |      |      |              |    |     |                                    |    |     |                  |    |     |                |    |     |                                   |    |     |                                          |    |     |                  |    |     |                                               |    |     |                                     |    |     |                                  |      |      |    |
| Highland Avenue                                      | WB L     | -210                                | -425 | -155 |              |    |     |                                    |    |     |                  |    |     |                |    |     |                                   |    |     |                                          |    |     |                  |    |     |                                               |    |     |                                     |    |     |                                  |      |      |    |
| Highland Avenue                                      | WB T     |                                     |      |      | 16           | 78 | 63  | 6                                  | 8  | 1   |                  |    |     |                |    |     | 15                                | 10 | 14  | 4                                        | 5  | 7   | 4                | 25 | 7   | 3                                             | 15 | 10  | 9                                   | 64 | 15  | -153                             | -220 | -38  |    |
| Highland Avenue                                      | WB R     |                                     |      |      |              |    |     |                                    |    |     |                  |    |     |                |    |     |                                   |    |     |                                          |    |     |                  |    |     |                                               |    |     |                                     |    |     |                                  |      |      |    |
| 1st Avenue                                           | NB L     | 210                                 | 425  | 155  |              |    |     |                                    |    |     |                  |    |     |                |    |     | 23                                | 15 | 21  | 6                                        | 8  | 10  | 6                | 38 | 10  |                                               |    |     |                                     |    |     | 245                              | 486  | 196  |    |
| Highland Avenue                                      | NB T     |                                     |      |      |              |    |     |                                    |    |     |                  |    |     |                |    |     |                                   |    |     |                                          |    |     |                  |    |     |                                               |    |     |                                     |    |     |                                  |      |      |    |
| Highland Avenue                                      | NB R     |                                     |      |      |              |    |     |                                    |    |     |                  |    |     |                |    |     |                                   |    |     |                                          |    |     |                  |    |     |                                               |    |     |                                     |    |     |                                  |      |      |    |
| Riverside Community Care Driveway                    | NB R     |                                     |      |      |              |    |     |                                    |    |     |                  |    |     |                |    |     |                                   |    |     |                                          |    |     |                  |    |     |                                               |    |     |                                     |    |     |                                  |      |      |    |
| Riverside Community Care Driveway                    | SB L     |                                     |      |      |              |    |     |                                    |    |     |                  |    |     |                |    |     |                                   |    |     |                                          |    |     |                  |    |     |                                               |    |     |                                     |    |     |                                  |      |      |    |
| Riverside Community Care Driveway                    | SB T     |                                     |      |      |              |    |     |                                    |    |     |                  |    |     |                |    |     |                                   |    |     |                                          |    |     |                  |    |     |                                               |    |     |                                     |    |     |                                  |      |      |    |
| Riverside Community Care Driveway                    | SB R     |                                     |      |      |              |    |     |                                    |    |     |                  |    |     |                |    |     |                                   |    |     |                                          |    |     |                  |    |     |                                               |    |     |                                     |    |     |                                  |      |      |    |
| 26. HIGHLAND AVENUE AT I-95 NORTHBOUND RAMPS         |          |                                     |      |      |              |    |     |                                    |    |     |                  |    |     |                |    |     |                                   |    |     |                                          |    |     |                  |    |     |                                               |    |     |                                     |    |     |                                  |      |      |    |
| Highland Avenue                                      | EB T     |                                     |      |      | 42           | 47 | 57  | 4                                  | 3  | 1   |                  |    |     |                |    |     | 12                                | 35 | 29  | 12                                       | 12 | 18  | 56               | 11 | 17  | 14                                            | 2  | 7   | 56                                  | 9  | 16  | 196                              | 119  | 145  |    |
| Highland Avenue                                      | EB R     |                                     |      |      |              |    |     |                                    |    |     |                  |    |     |                |    |     |                                   |    |     |                                          |    |     |                  |    |     |                                               |    |     |                                     |    |     |                                  |      |      |    |
| Highland Avenue                                      | WB T     |                                     |      |      | 13           | 65 | 52  | 5                                  | 6  | 1   |                  |    |     |                |    |     | 12                                | 8  | 11  | 3                                        | 4  | 5   | 3                | 21 | 5   | 1                                             | 5  | 3   | 3                                   | 19 | 4   | 40                               | 128  | 81   |    |
| Highland Avenue                                      | WB R     |                                     |      |      | 3            | 13 | 11  | 2                                  | 2  |     |                  |    |     |                |    |     | 26                                | 17 | 23  | 6                                        | 9  | 11  | 7                | 43 | 11  | 2                                             | 11 | 7   | 6                                   | 45 | 11  | 52                               | 140  | 74   |    |
| I-95 NB Off-Ramp Exit 19A                            | NB R     |                                     |      |      | 9            | 9  | 12  | 4                                  | 3  | 1   |                  |    |     |                |    |     | 2                                 | 5  | 4   | 2                                        | 2  | 3   | 8                | 2  | 2   | 4                                             |    | 2   | 16                                  | 3  | 4   | 45                               | 24   | 28   |    |
| I-95 NB Off-Ramp Exit 19B                            | SB R     |                                     |      |      |              |    |     |                                    |    |     |                  |    |     |                |    |     |                                   |    |     |                                          |    |     |                  |    |     |                                               |    |     |                                     |    |     |                                  |      |      |    |
| 27. HIGHLAND AVENUE AT I-95 SOUTHBOUND RAMPS         |          |                                     |      |      |              |    |     |                                    |    |     |                  |    |     |                |    |     |                                   |    |     |                                          |    |     |                  |    |     |                                               |    |     |                                     |    |     |                                  |      |      |    |
| Highland Avenue                                      | EB T     |                                     |      |      | 33           | 38 | 45  | 2                                  | 2  |     |                  |    |     |                |    |     | 3                                 | 8  | 7   | 3                                        | 3  | 4   | 13               | 2  | 4   | 1                                             |    | 1   | 6                                   | 1  | 2   | 61                               | 54   | 63   |    |
| Highland Avenue                                      | EB R     |                                     |      |      |              |    |     |                                    |    |     |                  |    |     |                |    |     |                                   |    |     |                                          |    |     |                  |    |     |                                               |    |     |                                     |    |     |                                  |      |      |    |
| Highland Avenue                                      | WB T     |                                     |      |      | 10           | 52 | 41  | 2                                  | 2  |     |                  |    |     |                |    |     | 8                                 | 5  | 7   | 2                                        | 3  | 3   | 2                | 13 | 3   |                                               | 1  | 1   | 1                                   | 5  | 1   | 25                               | 81   | 56   |    |
| Highland Avenue                                      | WB R     |                                     |      |      |              |    |     |                                    |    |     |                  |    |     |                |    |     |                                   |    |     |                                          |    |     |                  |    |     |                                               |    |     |                                     |    |     |                                  |      |      |    |







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## Trip Generation Projections





## ITE TRIP GENERATION WORKSHEET

(10th Edition, Updated 2017)

## EXISTING

LANDUSE: Shopping Center  
 LANDUSE CODE: 820  
 SETTING/LOCATION: General Urban/Suburban  
 JOB NAME:  
 JOB NUMBER:

Independent Variable ---

FLOOR AREA (KSF): 62.6**WEEKDAY**

| RATES:                | # Studies | R^2  | Total Trip Ends |      |        | Independent Variable Range |     |       | Directional Distribution |      |
|-----------------------|-----------|------|-----------------|------|--------|----------------------------|-----|-------|--------------------------|------|
|                       |           |      | Average         | Low  | High   | Average                    | Low | High  | Enter                    | Exit |
| DAILY                 | 147       | 0.76 | 37.75           | 7.42 | 207.98 | 453                        | 9   | 1,510 | 50%                      | 50%  |
| AM PEAK OF GENERATOR  | 47        | 0.71 | 3.00            | 0.70 | 23.74  | 323                        | 8   | 1,320 | 54%                      | 46%  |
| PM PEAK OF GENERATOR  | 53        | 0.76 | 4.21            | 0.78 | 27.27  | 298                        | 7   | 1,320 | 50%                      | 50%  |
| AM PEAK (ADJACENT ST) | 84        | 0.90 | 0.94            | 0.18 | 23.74  | 351                        | 9   | 1,510 | 62%                      | 38%  |
| PM PEAK (ADJACENT ST) | 261       | 0.82 | 3.81            | 0.74 | 18.69  | 327                        | 2   | 2,200 | 48%                      | 52%  |

## TRIPS:

|                       | BY AVERAGE |       |       | BY REGRESSION |       |       |
|-----------------------|------------|-------|-------|---------------|-------|-------|
|                       | Total      | Enter | Exit  | Total         | Enter | Exit  |
| DAILY                 | 2,363      | 1,182 | 1,182 | 4,372         | 2,186 | 2,186 |
| AM PEAK (ADJACENT ST) | 59         | 36    | 22    | 183           | 114   | 70    |
| PM PEAK (ADJACENT ST) | 239        | 114   | 124   | 384           | 184   | 200   |

**SATURDAY**

| RATES:            | # Studies | R^2  | Total Trip Ends |       |        | Independent Variable Range |     |       | Directional Distribution |      |
|-------------------|-----------|------|-----------------|-------|--------|----------------------------|-----|-------|--------------------------|------|
|                   |           |      | Average         | Low   | High   | Average                    | Low | High  | Enter                    | Exit |
| DAILY             | 58        | 0.71 | 46.12           | 13.07 | 167.89 | 602                        | 56  | 1,510 | 50%                      | 50%  |
| PEAK OF GENERATOR | 119       | 0.87 | 4.50            | 1.42  | 15.10  | 416                        | 4   | 1,510 | 52%                      | 48%  |

## TRIPS:

|                   | BY AVERAGE |       |       | BY REGRESSION |       |       |
|-------------------|------------|-------|-------|---------------|-------|-------|
|                   | Total      | Enter | Exit  | Total         | Enter | Exit  |
| DAILY             | 2,887      | 1,444 | 1,444 | 6,666         | 3,333 | 3,333 |
| PEAK OF GENERATOR | 282        | 146   | 135   | 428           | 222   | 205   |

**SUNDAY**

| RATES:            | # Studies | R^2 | Total Trip Ends |      |        | Independent Variable Range |     |       | Directional Distribution |      |
|-------------------|-----------|-----|-----------------|------|--------|----------------------------|-----|-------|--------------------------|------|
|                   |           |     | Average         | Low  | High   | Average                    | Low | High  | Enter                    | Exit |
| DAILY             | 30        | -   | 21.10           | 4.15 | 148.15 | 509                        | 47  | 1,510 | 50%                      | 50%  |
| PEAK OF GENERATOR | 24        | -   | 2.79            | 0.39 | 12.40  | 382                        | 47  | 1,268 | 49%                      | 51%  |

## TRIPS:

|                   | BY AVERAGE |       |      | BY REGRESSION |       |      |
|-------------------|------------|-------|------|---------------|-------|------|
|                   | Total      | Enter | Exit | Total         | Enter | Exit |
| DAILY             | 1,321      | 660   | 660  | N/A           | N/A   | N/A  |
| PEAK OF GENERATOR | 175        | 86    | 89   | N/A           | N/A   | N/A  |

ITE TRIP GENERATION WORKSHEET  
(10th Edition, Updated 2017)

EXISTING

LANDUSE: General Office Building  
LANDUSE CODE: 710  
SETTING/LOCATION: General Urban/Suburban  
JOB NAME:  
JOB NUMBER:

Independent Variable ---

FLOOR AREA (KSF): 180

**WEEKDAY**

| RATES: |                       | # Studies | R^2  | Total Trip Ends |      |       | Independent Variable Range |     |       | Directional Distribution |      |
|--------|-----------------------|-----------|------|-----------------|------|-------|----------------------------|-----|-------|--------------------------|------|
|        |                       |           |      | Average         | Low  | High  | Average                    | Low | High  | Enter                    | Exit |
|        | DAILY                 | 66        | 0.83 | 9.74            | 2.71 | 27.56 | 171                        | 6   | 1,300 | 50%                      | 50%  |
|        | AM PEAK OF GENERATOR  | 228       | 0.84 | 1.47            | 0.57 | 4.93  | 209                        | 6   | 2,408 | 88%                      | 12%  |
|        | PM PEAK OF GENERATOR  | 243       | 0.82 | 1.42            | 0.49 | 6.20  | 205                        | 6   | 2,408 | 18%                      | 82%  |
|        | AM PEAK (ADJACENT ST) | 35        | 0.85 | 1.16            | 0.37 | 4.23  | 117                        | 5   | 511   | 86%                      | 14%  |
|        | PM PEAK (ADJACENT ST) | 32        | 0.88 | 1.15            | 0.47 | 3.23  | 114                        | 6   | 511   | 16%                      | 84%  |

| TRIPS: |                       | BY AVERAGE |       |      | BY REGRESSION |       |      |
|--------|-----------------------|------------|-------|------|---------------|-------|------|
|        |                       | Total      | Enter | Exit | Total         | Enter | Exit |
|        | DAILY                 | 1,753      | 877   | 877  | 1,877         | 938   | 938  |
|        | AM PEAK (ADJACENT ST) | 209        | 180   | 29   | 196           | 168   | 27   |
|        | PM PEAK (ADJACENT ST) | 207        | 33    | 174  | 199           | 32    | 167  |

**SATURDAY**

| RATES: |                   | # Studies | R^2 | Total Trip Ends |      |      | Independent Variable Range |     |      | Directional Distribution |      |
|--------|-------------------|-----------|-----|-----------------|------|------|----------------------------|-----|------|--------------------------|------|
|        |                   |           |     | Average         | Low  | High | Average                    | Low | High | Enter                    | Exit |
|        | DAILY             | 5         | --  | 2.21            | 1.24 | 7.46 | 94                         | 28  | 183  | 50%                      | 50%  |
|        | PEAK OF GENERATOR | 3         | --  | 0.53            | 0.30 | 1.57 | 82                         | 28  | 183  | 54%                      | 46%  |

| TRIPS: |                   | BY AVERAGE |       |      | BY REGRESSION |       |      |
|--------|-------------------|------------|-------|------|---------------|-------|------|
|        |                   | Total      | Enter | Exit | Total         | Enter | Exit |
|        | DAILY             | 398        | 199   | 199  | N/A           | N/A   | N/A  |
|        | PEAK OF GENERATOR | 95         | 52    | 44   | N/A           | N/A   | N/A  |

**SUNDAY**

| RATES: |                   | # Studies | R^2 | Total Trip Ends |      |      | Independent Variable Range |     |      | Directional Distribution |      |
|--------|-------------------|-----------|-----|-----------------|------|------|----------------------------|-----|------|--------------------------|------|
|        |                   |           |     | Average         | Low  | High | Average                    | Low | High | Enter                    | Exit |
|        | DAILY             | 5         | --  | 0.70            | 0.19 | 3.05 | 94                         | 28  | 183  | 50%                      | 50%  |
|        | PEAK OF GENERATOR | 3         | --  | 0.21            | 0.11 | 0.68 | 82                         | 28  | 183  | 58%                      | 42%  |

| TRIPS: |                   | BY AVERAGE |       |      | BY REGRESSION |       |      |
|--------|-------------------|------------|-------|------|---------------|-------|------|
|        |                   | Total      | Enter | Exit | Total         | Enter | Exit |
|        | DAILY             | 126        | 63    | 63   | N/A           | N/A   | N/A  |
|        | PEAK OF GENERATOR | 38         | 22    | 16   | N/A           | N/A   | N/A  |

ITE TRIP GENERATION WORKSHEET  
(10th Edition, Updated 2017)

PROPOSED

LANDUSE: Mid-Rise Residential  
LANDUSE CODE: 221  
SETTING/LOCATION: General Urban/Suburban  
JOB NAME:  
JOB NUMBER:

Independent Variable --- Number of Units

824 units

**WEEKDAY**

| RATES: |                       | # Studies | R^2  | Total Trip Ends |      |       | Independent Variable Range |     |       | Directional Distribution |      |
|--------|-----------------------|-----------|------|-----------------|------|-------|----------------------------|-----|-------|--------------------------|------|
|        |                       |           |      | Average         | Low  | High  | Average                    | Low | High  | Enter                    | Exit |
|        | DAILY                 | 27        | 0.77 | 5.44            | 1.27 | 12.50 | 205                        | 21  | 494   | 50%                      | 50%  |
|        | AM PEAK OF GENERATOR  | 48        | 0.69 | 0.32            | 0.06 | 0.77  | 225                        | 21  | 1,168 | 27%                      | 73%  |
|        | PM PEAK OF GENERATOR  | 47        | 0.66 | 0.41            | 0.09 | 1.26  | 211                        | 21  | 1,168 | 60%                      | 40%  |
|        | AM PEAK (ADJACENT ST) | 53        | 0.67 | 0.36            | 0.06 | 1.61  | 207                        | 26  | 703   | 26%                      | 74%  |
|        | PM PEAK (ADJACENT ST) | 60        | 0.72 | 0.44            | 0.15 | 1.11  | 208                        | 26  | 703   | 61%                      | 39%  |

TRIPS:

|  |                       | BY AVERAGE |       |       | BY REGRESSION |       |       |
|--|-----------------------|------------|-------|-------|---------------|-------|-------|
|  |                       | Total      | Enter | Exit  | Total         | Enter | Exit  |
|  | DAILY                 | 4,483      | 2,241 | 2,241 | 4,489         | 2,245 | 2,245 |
|  | AM PEAK (ADJACENT ST) | 297        | 77    | 220   | 270           | 70    | 200   |
|  | PM PEAK (ADJACENT ST) | 363        | 221   | 141   | 335           | 205   | 131   |

**SATURDAY**

| RATES: |                   | # Studies | R^2  | Total Trip Ends |      |      | Independent Variable Range |     |      | Directional Distribution |      |
|--------|-------------------|-----------|------|-----------------|------|------|----------------------------|-----|------|--------------------------|------|
|        |                   |           |      | Average         | Low  | High | Average                    | Low | High | Enter                    | Exit |
|        | DAILY             | 6         | 0.73 | 4.91            | 4.03 | 8.51 | 224                        | 111 | 336  | 50%                      | 50%  |
|        | PEAK OF GENERATOR | 8         | 0.89 | 0.44            | 0.34 | 0.73 | 264                        | 111 | 462  | 49%                      | 51%  |

TRIPS:

|  |                   | BY AVERAGE |       |       | BY REGRESSION |       |       |
|--|-------------------|------------|-------|-------|---------------|-------|-------|
|  |                   | Total      | Enter | Exit  | Total         | Enter | Exit  |
|  | DAILY             | 4,046      | 2,023 | 2,023 | 2,922         | 1,461 | 1,461 |
|  | PEAK OF GENERATOR | 363        | 178   | 185   | 353           | 173   | 180   |

**SUNDAY**

| RATES: |                   | # Studies | R^2 | Total Trip Ends |      |      | Independent Variable Range |     |      | Directional Distribution |      |
|--------|-------------------|-----------|-----|-----------------|------|------|----------------------------|-----|------|--------------------------|------|
|        |                   |           |     | Average         | Low  | High | Average                    | Low | High | Enter                    | Exit |
|        | DAILY             | 6         | --  | 4.09            | 3.06 | 8.41 | 224                        | 111 | 336  | 50%                      | 50%  |
|        | PEAK OF GENERATOR | 6         | --  | 0.39            | 0.26 | 1.07 | 224                        | 111 | 336  | 62%                      | 38%  |

TRIPS:

|  |                   | BY AVERAGE |       |       | BY REGRESSION |       |      |
|--|-------------------|------------|-------|-------|---------------|-------|------|
|  |                   | Total      | Enter | Exit  | Total         | Enter | Exit |
|  | DAILY             | 3,370      | 1,685 | 1,685 | N/A           | N/A   | N/A  |
|  | PEAK OF GENERATOR | 321        | 199   | 122   | NA            | NA    | NA   |

ITE TRIP GENERATION WORKSHEET  
(10th Edition, Updated 2017)

PROPOSED

LANDUSE: Shopping Center  
LANDUSE CODE: 820  
SETTING/LOCATION: General Urban/Suburban  
JOB NAME:  
JOB NUMBER:

Independent Variable ---

FLOOR AREA (KSF): 237.0

**WEEKDAY**

| RATES: |                       | # Studies | R^2  | Total Trip Ends |      |        | Independent Variable Range |     |       | Directional Distribution |      |
|--------|-----------------------|-----------|------|-----------------|------|--------|----------------------------|-----|-------|--------------------------|------|
|        |                       |           |      | Average         | Low  | High   | Average                    | Low | High  | Enter                    | Exit |
|        | DAILY                 | 147       | 0.76 | 37.75           | 7.42 | 207.98 | 453                        | 9   | 1,510 | 50%                      | 50%  |
|        | AM PEAK OF GENERATOR  | 47        | 0.71 | 3.00            | 0.70 | 23.74  | 323                        | 8   | 1,320 | 54%                      | 46%  |
|        | PM PEAK OF GENERATOR  | 53        | 0.76 | 4.21            | 0.78 | 27.27  | 298                        | 7   | 1,320 | 50%                      | 50%  |
|        | AM PEAK (ADJACENT ST) | 84        | 0.90 | 0.94            | 0.18 | 23.74  | 351                        | 9   | 1,510 | 62%                      | 38%  |
|        | PM PEAK (ADJACENT ST) | 261       | 0.82 | 3.81            | 0.74 | 18.69  | 327                        | 2   | 2,200 | 48%                      | 52%  |

TRIPS:

|  |                       | BY AVERAGE |       |       | BY REGRESSION |       |       |
|--|-----------------------|------------|-------|-------|---------------|-------|-------|
|  |                       | Total      | Enter | Exit  | Total         | Enter | Exit  |
|  | DAILY                 | 8,947      | 4,473 | 4,473 | 10,811        | 5,405 | 5,405 |
|  | AM PEAK (ADJACENT ST) | 223        | 138   | 85    | 270           | 168   | 103   |
|  | PM PEAK (ADJACENT ST) | 903        | 433   | 470   | 1,029         | 494   | 535   |

**SATURDAY**

| RATES: |                   | # Studies | R^2  | Total Trip Ends |       |        | Independent Variable Range |     |       | Directional Distribution |      |
|--------|-------------------|-----------|------|-----------------|-------|--------|----------------------------|-----|-------|--------------------------|------|
|        |                   |           |      | Average         | Low   | High   | Average                    | Low | High  | Enter                    | Exit |
|        | DAILY             | 58        | 0.71 | 46.12           | 13.07 | 167.89 | 602                        | 56  | 1,510 | 50%                      | 50%  |
|        | PEAK OF GENERATOR | 119       | 0.87 | 4.50            | 1.42  | 15.10  | 416                        | 4   | 1,510 | 52%                      | 48%  |

TRIPS:

|  |                   | BY AVERAGE |       |       | BY REGRESSION |       |       |
|--|-------------------|------------|-------|-------|---------------|-------|-------|
|  |                   | Total      | Enter | Exit  | Total         | Enter | Exit  |
|  | DAILY             | 10,930     | 5,465 | 5,465 | 15,217        | 7,609 | 7,609 |
|  | PEAK OF GENERATOR | 1,067      | 555   | 512   | 1,224         | 636   | 587   |

**SUNDAY**

| RATES: |                   | # Studies | R^2 | Total Trip Ends |      |        | Independent Variable Range |     |       | Directional Distribution |      |
|--------|-------------------|-----------|-----|-----------------|------|--------|----------------------------|-----|-------|--------------------------|------|
|        |                   |           |     | Average         | Low  | High   | Average                    | Low | High  | Enter                    | Exit |
|        | DAILY             | 30        | -   | 21.10           | 4.15 | 148.15 | 509                        | 47  | 1,510 | 50%                      | 50%  |
|        | PEAK OF GENERATOR | 24        | -   | 2.79            | 0.39 | 12.40  | 382                        | 47  | 1,268 | 49%                      | 51%  |

TRIPS:

|  |                   | BY AVERAGE |       |       | BY REGRESSION |       |      |
|--|-------------------|------------|-------|-------|---------------|-------|------|
|  |                   | Total      | Enter | Exit  | Total         | Enter | Exit |
|  | DAILY             | 5,001      | 2,500 | 2,500 | N/A           | N/A   | N/A  |
|  | PEAK OF GENERATOR | 661        | 324   | 337   | N/A           | N/A   | N/A  |

ITE TRIP GENERATION WORKSHEET  
(10th Edition, Updated 2017)

PROPOSED

LANDUSE: General Office Building  
LANDUSE CODE: 710  
SETTING/LOCATION: General Urban/Suburban  
JOB NAME:  
JOB NUMBER:

Independent Variable ---

FLOOR AREA (KSF): 180

**WEEKDAY**

| RATES:                | # Studies | R^2  | Total Trip Ends |      |       | Independent Variable Range |     |       | Directional Distribution |      |
|-----------------------|-----------|------|-----------------|------|-------|----------------------------|-----|-------|--------------------------|------|
|                       |           |      | Average         | Low  | High  | Average                    | Low | High  | Enter                    | Exit |
| DAILY                 | 66        | 0.83 | 9.74            | 2.71 | 27.56 | 171                        | 6   | 1,300 | 50%                      | 50%  |
| AM PEAK OF GENERATOR  | 228       | 0.84 | 1.47            | 0.57 | 4.93  | 209                        | 6   | 2,408 | 88%                      | 12%  |
| PM PEAK OF GENERATOR  | 243       | 0.82 | 1.42            | 0.49 | 6.20  | 205                        | 6   | 2,408 | 18%                      | 82%  |
| AM PEAK (ADJACENT ST) | 35        | 0.85 | 1.16            | 0.37 | 4.23  | 117                        | 5   | 511   | 86%                      | 14%  |
| PM PEAK (ADJACENT ST) | 32        | 0.88 | 1.15            | 0.47 | 3.23  | 114                        | 6   | 511   | 16%                      | 84%  |

TRIPS:

|                       | BY AVERAGE |       |      | BY REGRESSION |       |      |
|-----------------------|------------|-------|------|---------------|-------|------|
|                       | Total      | Enter | Exit | Total         | Enter | Exit |
| DAILY                 | 1,753      | 877   | 877  | 1,877         | 938   | 938  |
| AM PEAK (ADJACENT ST) | 209        | 180   | 29   | 196           | 168   | 27   |
| PM PEAK (ADJACENT ST) | 207        | 33    | 174  | 199           | 32    | 167  |

**SATURDAY**

| RATES:            | # Studies | R^2 | Total Trip Ends |      |      | Independent Variable Range |     |      | Directional Distribution |      |
|-------------------|-----------|-----|-----------------|------|------|----------------------------|-----|------|--------------------------|------|
|                   |           |     | Average         | Low  | High | Average                    | Low | High | Enter                    | Exit |
| DAILY             | 5         | --  | 2.21            | 1.24 | 7.46 | 94                         | 28  | 183  | 50%                      | 50%  |
| PEAK OF GENERATOR | 3         | --  | 0.53            | 0.30 | 1.57 | 82                         | 28  | 183  | 54%                      | 46%  |

TRIPS:

|                   | BY AVERAGE |       |      | BY REGRESSION |       |      |
|-------------------|------------|-------|------|---------------|-------|------|
|                   | Total      | Enter | Exit | Total         | Enter | Exit |
| DAILY             | 398        | 199   | 199  | N/A           | N/A   | N/A  |
| PEAK OF GENERATOR | 95         | 52    | 44   | N/A           | N/A   | N/A  |

**SUNDAY**

| RATES:            | # Studies | R^2 | Total Trip Ends |      |      | Independent Variable Range |     |      | Directional Distribution |      |
|-------------------|-----------|-----|-----------------|------|------|----------------------------|-----|------|--------------------------|------|
|                   |           |     | Average         | Low  | High | Average                    | Low | High | Enter                    | Exit |
| DAILY             | 5         | --  | 0.70            | 0.19 | 3.05 | 94                         | 28  | 183  | 50%                      | 50%  |
| PEAK OF GENERATOR | 3         | --  | 0.21            | 0.11 | 0.68 | 82                         | 28  | 183  | 58%                      | 42%  |

TRIPS:

|                   | BY AVERAGE |       |      | BY REGRESSION |       |      |
|-------------------|------------|-------|------|---------------|-------|------|
|                   | Total      | Enter | Exit | Total         | Enter | Exit |
| DAILY             | 126        | 63    | 63   | N/A           | N/A   | N/A  |
| PEAK OF GENERATOR | 38         | 22    | 16   | N/A           | N/A   | N/A  |

## ITE TRIP GENERATION WORKSHEET

(10th Edition, Updated 2017)

## AS-OF-RIGHT

LANDUSE: General Office Building  
 LANDUSE CODE: 710  
 SETTING/LOCATION: General Urban/Suburban  
 JOB NAME:  
 JOB NUMBER:

Independent Variable ---

FLOOR AREA (KSF): 1,480**WEEKDAY**

| RATES:                | # Studies | R^2  | Total Trip Ends |      |       | Independent Variable Range |     |       | Directional Distribution |      |
|-----------------------|-----------|------|-----------------|------|-------|----------------------------|-----|-------|--------------------------|------|
|                       |           |      | Average         | Low  | High  | Average                    | Low | High  | Enter                    | Exit |
| DAILY                 | 66        | 0.83 | 9.74            | 2.71 | 27.56 | 171                        | 6   | 1,300 | 50%                      | 50%  |
| AM PEAK OF GENERATOR  | 228       | 0.84 | 1.47            | 0.57 | 4.93  | 209                        | 6   | 2,408 | 88%                      | 12%  |
| PM PEAK OF GENERATOR  | 243       | 0.82 | 1.42            | 0.49 | 6.20  | 205                        | 6   | 2,408 | 18%                      | 82%  |
| AM PEAK (ADJACENT ST) | 35        | 0.85 | 1.16            | 0.37 | 4.23  | 117                        | 5   | 511   | 86%                      | 14%  |
| PM PEAK (ADJACENT ST) | 32        | 0.88 | 1.15            | 0.47 | 3.23  | 114                        | 6   | 511   | 16%                      | 84%  |

## TRIPS:

|                       | BY AVERAGE |       |       | BY REGRESSION |       |       |
|-----------------------|------------|-------|-------|---------------|-------|-------|
|                       | Total      | Enter | Exit  | Total         | Enter | Exit  |
| DAILY                 | 14,415     | 7,208 | 7,208 | 14,484        | 7,242 | 7,242 |
| AM PEAK (ADJACENT ST) | 1,717      | 1,476 | 240   | 1,418         | 1,219 | 198   |
| PM PEAK (ADJACENT ST) | 1,702      | 272   | 1,430 | 1,473         | 236   | 1,237 |

**SATURDAY**

| RATES:            | # Studies | R^2 | Total Trip Ends |      |      | Independent Variable Range |     |      | Directional Distribution |      |
|-------------------|-----------|-----|-----------------|------|------|----------------------------|-----|------|--------------------------|------|
|                   |           |     | Average         | Low  | High | Average                    | Low | High | Enter                    | Exit |
| DAILY             | 5         | --  | 2.21            | 1.24 | 7.46 | 94                         | 28  | 183  | 50%                      | 50%  |
| PEAK OF GENERATOR | 3         | --  | 0.53            | 0.30 | 1.57 | 82                         | 28  | 183  | 54%                      | 46%  |

## TRIPS:

|                   | BY AVERAGE |       |       | BY REGRESSION |       |      |
|-------------------|------------|-------|-------|---------------|-------|------|
|                   | Total      | Enter | Exit  | Total         | Enter | Exit |
| DAILY             | 3,271      | 1,635 | 1,635 | N/A           | N/A   | N/A  |
| PEAK OF GENERATOR | 784        | 424   | 361   | N/A           | N/A   | N/A  |

**SUNDAY**

| RATES:            | # Studies | R^2 | Total Trip Ends |      |      | Independent Variable Range |     |      | Directional Distribution |      |
|-------------------|-----------|-----|-----------------|------|------|----------------------------|-----|------|--------------------------|------|
|                   |           |     | Average         | Low  | High | Average                    | Low | High | Enter                    | Exit |
| DAILY             | 5         | --  | 0.70            | 0.19 | 3.05 | 94                         | 28  | 183  | 50%                      | 50%  |
| PEAK OF GENERATOR | 3         | --  | 0.21            | 0.11 | 0.68 | 82                         | 28  | 183  | 58%                      | 42%  |

## TRIPS:

|                   | BY AVERAGE |       |      | BY REGRESSION |       |      |
|-------------------|------------|-------|------|---------------|-------|------|
|                   | Total      | Enter | Exit | Total         | Enter | Exit |
| DAILY             | 1,036      | 518   | 518  | N/A           | N/A   | N/A  |
| PEAK OF GENERATOR | 311        | 180   | 131  | N/A           | N/A   | N/A  |

EXISTING SHARED PERSON TRIPS - WEEKDAY

| RETAIL - OFFICE |    |       |          |       |     |                 |     |     |          |     |     |
|-----------------|----|-------|----------|-------|-----|-----------------|-----|-----|----------|-----|-----|
| WEEKDAY DAILY   |    |       |          |       |     | WEEKDAY MORNING |     |     |          |     |     |
| RETAIL          | %  | #     | BALANCED | #     | %   | RETAIL          | %   | #   | BALANCED | #   | %   |
| EXIT ->         | 3% | 3,891 | 117      | 1,060 | 15% | EXIT ->         | 29% | 124 | 8        | 190 | 4%  |
| ENTER <-        | 4% | 3,891 | 156      | 1,060 | 22% | ENTER <-        | 32% | 202 | 9        | 31  | 28% |
| OFFICE          |    |       |          |       |     | OFFICE          |     |     |          |     |     |
| -> ENTER        |    |       |          |       |     | -> ENTER        |     |     |          |     |     |
| <- EXIT         |    |       |          |       |     | <- EXIT         |     |     |          |     |     |

| WEEKDAY EVENING |    |     |          |     |     |
|-----------------|----|-----|----------|-----|-----|
| RETAIL          | %  | #   | BALANCED | #   | %   |
| EXIT ->         | 2% | 356 | 7        | 36  | 31% |
| ENTER <-        | 8% | 328 | 26       | 189 | 20% |
| OFFICE          |    |     |          |     |     |
| -> ENTER        |    |     |          |     |     |
| <- EXIT         |    |     |          |     |     |

| TOTAL SHARED TRIPS - WEEKDAY DAILY |       |      |       |
|------------------------------------|-------|------|-------|
|                                    | ENTER | EXIT | TOTAL |
| RETAIL                             | 156   | 117  | 273   |
| OFFICE                             | 117   | 156  | 273   |

| TOTAL SHARED TRIPS - WEEKDAY MORNING |       |      |       |
|--------------------------------------|-------|------|-------|
|                                      | ENTER | EXIT | TOTAL |
| RETAIL                               | 9     | 8    | 17    |
| OFFICE                               | 8     | 9    | 17    |

| TOTAL SHARED TRIPS - WEEKDAY EVENING |       |      |       |
|--------------------------------------|-------|------|-------|
|                                      | ENTER | EXIT | TOTAL |
| RETAIL                               | 26    | 7    | 33    |
| OFFICE                               | 7     | 26   | 33    |

1 Weekday AM and PM Internal capture rates based on NCHRP Report 684, Saturday midday rates assumed to be the same was weekday evening rates  
2 Daily Internal capture rates based on Trip Generation Handbook, 1st Edition, 2001.

EXISTING SHARED PERSON TRIPS - SATURDAY

| RETAIL - OFFICE |    |       |          |     |     |          |                 |    |     |          |    |     |          |
|-----------------|----|-------|----------|-----|-----|----------|-----------------|----|-----|----------|----|-----|----------|
| SATURDAY DAILY  |    |       |          |     |     |          | SATURDAY MIDDAY |    |     |          |    |     |          |
| RETAIL          | %  | #     | BALANCED | #   | %   | OFFICE   | RETAIL          | %  | #   | BALANCED | #  | %   | OFFICE   |
| EXIT ->         | 3% | 5,933 | 34       | 225 | 15% | -> ENTER | EXIT ->         | 2% | 365 | 7        | 58 | 31% | -> ENTER |
| ENTER <-        | 4% | 5,933 | 50       | 225 | 22% | <- EXIT  | ENTER <-        | 8% | 396 | 10       | 50 | 20% | <- EXIT  |

| TOTAL SHARED TRIPS - SATURDAY DAILY |       |      |       |
|-------------------------------------|-------|------|-------|
|                                     | ENTER | EXIT | TOTAL |
| RETAIL                              | 50    | 34   | 84    |
| OFFICE                              | 34    | 50   | 84    |

| TOTAL SHARED TRIPS - SATURDAY MIDDAY |       |      |       |
|--------------------------------------|-------|------|-------|
|                                      | ENTER | EXIT | TOTAL |
| RETAIL                               | 10    | 7    | 17    |
| OFFICE                               | 7     | 10   | 17    |

1 Weekday AM and PM Internal capture rates based on NCHRP Report 684, Saturday midday rates assumed to be the same was weekday evening rates  
2 Daily Internal capture rates based on Trip Generation Handbook, 1st Edition, 2001.



## PROPOSED SHARED PERSON TRIPS - WEEKDAY

| RETAIL - OFFICE |     |       |          |       |     |          |
|-----------------|-----|-------|----------|-------|-----|----------|
| WEEKDAY DAILY   |     |       |          |       |     |          |
| RETAIL          | %   | #     | BALANCED | #     | %   | OFFICE   |
| EXIT ->         | 3%  | 9,621 | 159      | 1,060 | 15% | -> ENTER |
| ENTER <-        | 4%  | 9,621 | 233      | 1,060 | 22% | <- EXIT  |
| WEEKDAY MORNING |     |       |          |       |     |          |
| RETAIL          | %   | #     | BALANCED | #     | %   | OFFICE   |
| EXIT ->         | 29% | 183   | 8        | 190   | 4%  | -> ENTER |
| ENTER <-        | 32% | 298   | 9        | 31    | 28% | <- EXIT  |
| WEEKDAY EVENING |     |       |          |       |     |          |
| RETAIL          | %   | #     | BALANCED | #     | %   | OFFICE   |
| EXIT ->         | 2%  | 952   | 11       | 36    | 31% | -> ENTER |
| ENTER <-        | 8%  | 879   | 38       | 189   | 20% | <- EXIT  |

| RETAIL - RESIDENTIAL |     |       |          |       |     |             |
|----------------------|-----|-------|----------|-------|-----|-------------|
| WEEKDAY DAILY        |     |       |          |       |     |             |
| RETAIL               | %   | #     | BALANCED | #     | %   | RESIDENTIAL |
| EXIT ->              | 26% | 9,621 | 1,167    | 2,536 | 46% | -> ENTER    |
| ENTER <-             | 10% | 9,621 | 962      | 2,536 | 42% | <- EXIT     |
| WEEKDAY MORNING      |     |       |          |       |     |             |
| RETAIL               | %   | #     | BALANCED | #     | %   | RESIDENTIAL |
| EXIT ->              | 14% | 183   | 2        | 79    | 2%  | -> ENTER    |
| ENTER <-             | 17% | 298   | 2        | 226   | 1%  | <- EXIT     |
| WEEKDAY EVENING      |     |       |          |       |     |             |
| RETAIL               | %   | #     | BALANCED | #     | %   | RESIDENTIAL |
| EXIT ->              | 26% | 952   | 106      | 231   | 46% | -> ENTER    |
| ENTER <-             | 10% | 879   | 62       | 148   | 42% | <- EXIT     |

| OFFICE - RESIDENTIAL |     |       |          |       |    |             |
|----------------------|-----|-------|----------|-------|----|-------------|
| WEEKDAY DAILY        |     |       |          |       |    |             |
| OFFICE               | %   | #     | BALANCED | #     | %  | RESIDENTIAL |
| EXIT ->              | 2%  | 1,060 | 21       | 2,536 | 3% | -> ENTER    |
| ENTER <-             | 0%  | 1,060 | 0        | 2,536 | 0% | <- EXIT     |
| WEEKDAY MORNING      |     |       |          |       |    |             |
| OFFICE               | %   | #     | BALANCED | #     | %  | RESIDENTIAL |
| EXIT ->              | 1%  | 31    | 0        | 79    | 0% | -> ENTER    |
| ENTER <-             | 3%  | 190   | 5        | 226   | 2% | <- EXIT     |
| WEEKDAY EVENING      |     |       |          |       |    |             |
| OFFICE               | %   | #     | BALANCED | #     | %  | RESIDENTIAL |
| EXIT ->              | 2%  | 189   | 4        | 231   | 4% | -> ENTER    |
| ENTER <-             | 57% | 36    | 6        | 148   | 4% | <- EXIT     |

| TOTAL SHARED TRIPS - WEEKDAY DAILY |       |       |       |
|------------------------------------|-------|-------|-------|
|                                    | ENTER | EXIT  | TOTAL |
| RETAIL                             | 1,195 | 1,326 | 2521  |
| OFFICE                             | 159   | 254   | 413   |
| RES                                | 1,188 | 962   | 2150  |

| TOTAL SHARED TRIPS - WEEKDAY MORNING |       |      |       |
|--------------------------------------|-------|------|-------|
|                                      | ENTER | EXIT | TOTAL |
| RETAIL                               | 11    | 10   | 21    |
| OFFICE                               | 13    | 9    | 22    |
| RES                                  | 2     | 7    | 9     |

| TOTAL SHARED TRIPS - WEEKDAY EVENING |       |      |       |
|--------------------------------------|-------|------|-------|
|                                      | ENTER | EXIT | TOTAL |
| RETAIL                               | 100   | 117  | 217   |
| OFFICE                               | 17    | 42   | 59    |
| RES                                  | 110   | 68   | 178   |

1 Weekday AM and PM Internal capture rates based on NCHRP Report 684, Saturday midday rates assumed to be the same was weekday evening rate  
2 Daily Internal capture rates based on Trip Generation Handbook, 1st Edition, 2001

PROPOSED SHARED PERSON TRIPS - SATURDAY

| RETAIL - OFFICE |    |        |          |     |     |          |                 |    |       |          |    |     |          |
|-----------------|----|--------|----------|-----|-----|----------|-----------------|----|-------|----------|----|-----|----------|
| SATURDAY DAILY  |    |        |          |     |     |          | SATURDAY MIDDAY |    |       |          |    |     |          |
| RETAIL          | %  | #      | BALANCED | #   | %   | OFFICE   | RETAIL          | %  | #     | BALANCED | #  | %   | OFFICE   |
| EXIT ->         | 3% | 13,544 | 34       | 225 | 15% | -> ENTER | EXIT ->         | 2% | 1,046 | 18       | 58 | 31% | -> ENTER |
| ENTER <-        | 4% | 13,544 | 50       | 225 | 22% | <- EXIT  | ENTER <-        | 8% | 1,133 | 10       | 50 | 20% | <- EXIT  |

| RETAIL - RESIDENTIAL |     |        |          |       |     |             |                 |     |       |          |     |     |             |
|----------------------|-----|--------|----------|-------|-----|-------------|-----------------|-----|-------|----------|-----|-----|-------------|
| SATURDAY DAILY       |     |        |          |       |     |             | SATURDAY MIDDAY |     |       |          |     |     |             |
| RETAIL               | %   | #      | BALANCED | #     | %   | RESIDENTIAL | RETAIL          | %   | #     | BALANCED | #   | %   | RESIDENTIAL |
| EXIT ->              | 26% | 13,544 | 759      | 1,651 | 46% | -> ENTER    | EXIT ->         | 26% | 1,046 | 90       | 195 | 46% | -> ENTER    |
| ENTER <-             | 10% | 13,544 | 693      | 1,651 | 42% | <- EXIT     | ENTER <-        | 10% | 1,133 | 85       | 203 | 42% | <- EXIT     |

| OFFICE - RESIDENTIAL |    |     |          |       |    |             |                 |     |    |          |     |    |             |
|----------------------|----|-----|----------|-------|----|-------------|-----------------|-----|----|----------|-----|----|-------------|
| SATURDAY DAILY       |    |     |          |       |    |             | SATURDAY MIDDAY |     |    |          |     |    |             |
| OFFICE               | %  | #   | BALANCED | #     | %  | RESIDENTIAL | OFFICE          | %   | #  | BALANCED | #   | %  | RESIDENTIAL |
| EXIT ->              | 2% | 225 | 5        | 1,651 | 3% | -> ENTER    | EXIT ->         | 2%  | 50 | 1        | 195 | 4% | -> ENTER    |
| ENTER <-             | 0% | 225 | 0        | 1,651 | 0% | <- EXIT     | ENTER <-        | 57% | 58 | 8        | 203 | 4% | <- EXIT     |

| TOTAL SHARED TRIPS - SATURDAY DAILY |       |      |       |
|-------------------------------------|-------|------|-------|
|                                     | ENTER | EXIT | TOTAL |
| RETAIL                              | 743   | 793  | 1536  |
| OFFICE                              | 34    | 55   | 89    |
| RES                                 | 764   | 693  | 1457  |

| TOTAL SHARED TRIPS - SATURDAY MIDDAY |       |      |       |
|--------------------------------------|-------|------|-------|
|                                      | ENTER | EXIT | TOTAL |
| RETAIL                               | 95    | 108  | 203   |
| OFFICE                               | 26    | 11   | 37    |
| RES                                  | 91    | 93   | 184   |

1 Weekday AM and PM Internal capture rates based on NCHRP Report 684, Saturday midday rates assumed to be the same was weekday evening rate  
2 Daily Internal capture rates based on Trip Generation Handbook, 1st Edition, 2001





**2010 Census -Work in Newton**  
**Mode Share - Aggregate**

| <b>Mode</b>                                         | <b>Total</b>  | <b>Percent</b> |
|-----------------------------------------------------|---------------|----------------|
| Car, truck, or van -- Drove alone                   | 33,631        | 73.3%          |
| Car, truck, or van -- In a 2-person carpool         | 2,838         | 6.2%           |
| Car, truck, or van -- In a 3-person carpool         | 353           | 0.8%           |
| Car, truck, or van -- In a 4-person carpool         | 205           | 0.4%           |
| Car, truck, or van -- In a 5-or-6-person carpool    | 34            | 0.1%           |
| Car, truck, or van -- In a 7-or-more-person carpool | 55            | 0.1%           |
| Bus or trolley bus                                  | 1,460         | 3.2%           |
| Streetcar or trolley car                            | 350           | 0.8%           |
| Subway or elevated                                  | 1,035         | 2.3%           |
| Railroad                                            | 170           | 0.4%           |
| Ferryboat                                           | 0             | 0.0%           |
| Bicycle                                             | 355           | 0.8%           |
| Walked                                              | 1,735         | 3.8%           |
| Taxicab                                             | 20            | 0.0%           |
| Motorcycle                                          | 20            | 0.0%           |
| Other method                                        | 215           | 0.5%           |
| Worked at home                                      | 3,410         | 7.4%           |
| <b>Total</b>                                        | <b>45,886</b> | <b>100.0%</b>  |

**Mode Share - Combined**

| <b>Mode</b>    | <b>Total</b>  | <b>Percent</b> |
|----------------|---------------|----------------|
| Vehicle        | 37,156        | 81.0%          |
| Transit        | 3,015         | 6.6%           |
| Bicycle        | 355           | 0.8%           |
| Walked         | 1,735         | 3.8%           |
| Other method   | 215           | 0.5%           |
| Worked at home | 3,410         | 7.4%           |
| <b>Total</b>   | <b>45,886</b> | <b>100.0%</b>  |

**Mode Share - For Comparison**

| <b>Mode</b>  | <b>Total</b>  | <b>Percent</b> |
|--------------|---------------|----------------|
| Vehicle      | 37,156        | 81.0%          |
| Transit      | 3,015         | 6.6%           |
| Bike         | 355           | 0.8%           |
| Walk         | 1,735         | 3.8%           |
| Other        | 3,625         | 7.9%           |
| <b>Total</b> | <b>45,886</b> | <b>100.0%</b>  |

**Vehicle Occupancy Rate**

| <b>Vehicle Occupancy</b> | <b>Total</b> |
|--------------------------|--------------|
| 1                        | 33,671       |
| 2                        | 2,838        |
| 3                        | 353          |
| 4                        | 205          |
| 5                        | 17           |
| 6                        | 17           |
| 7                        | 55           |
| <b>VOR</b>               | <b>1.12</b>  |

# 2010 Census - Live in Newton

## Mode Share - Aggregate

| Mode                                                | Total         | Percent       |
|-----------------------------------------------------|---------------|---------------|
| Car, truck, or van -- Drove alone                   | 25,358        | 65.4%         |
| Car, truck, or van -- In a 2-person carpool         | 2,572         | 6.6%          |
| Car, truck, or van -- In a 3-person carpool         | 305           | 0.8%          |
| Car, truck, or van -- In a 4-person carpool         | 50            | 0.1%          |
| Car, truck, or van -- In a 5-or-6-person carpool    | 24            | 0.1%          |
| Car, truck, or van -- In a 7-or-more-person carpool | 59            | 0.2%          |
| Bus or trolley bus                                  | 1,775         | 4.6%          |
| Streetcar or trolley car                            | 660           | 1.7%          |
| Subway or elevated                                  | 1,580         | 4.1%          |
| Railroad                                            | 960           | 2.5%          |
| Ferryboat                                           | 0             | 0.0%          |
| Bicycle                                             | 274           | 0.7%          |
| Walked                                              | 1,540         | 4.0%          |
| Taxicab                                             | 20            | 0.1%          |
| Motorcycle                                          | 10            | 0.0%          |
| Other method                                        | 180           | 0.5%          |
| Worked at home                                      | 3,410         | 8.8%          |
| <b>Total</b>                                        | <b>38,777</b> | <b>100.0%</b> |

## Mode Share - Combined

| Mode           | Total         | Percent       |
|----------------|---------------|---------------|
| Vehicle        | 28,398        | 73.2%         |
| Transit        | 4,975         | 12.8%         |
| Bicycle        | 274           | 0.7%          |
| Walked         | 1,540         | 4.0%          |
| Other method   | 180           | 0.5%          |
| Worked at home | 3,410         | 8.8%          |
| <b>Total</b>   | <b>38,777</b> | <b>100.0%</b> |

## Mode Share - For Comparison

| Mode         | Total         | Percent       |
|--------------|---------------|---------------|
| Vehicle      | 28,398        | 73.2%         |
| Transit      | 4,975         | 12.8%         |
| Bike         | 274           | 0.7%          |
| Walk         | 1,540         | 4.0%          |
| Other        | 3,590         | 9.3%          |
| <b>Total</b> | <b>38,777</b> | <b>100.0%</b> |

## Vehicle Occupancy Rate

| Vehicle Occupancy | Total       |
|-------------------|-------------|
| 1                 | 25,388      |
| 2                 | 2,572       |
| 3                 | 305         |
| 4                 | 50          |
| 5                 | 12          |
| 6                 | 12          |
| 7                 | 59          |
| <b>VOR</b>        | <b>1.13</b> |



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## Trip Distribution Calculation Worksheets





Work to Home  
Work in Newton

| Residence                                            | Count  | Adjustment<br>Percentage <sup>1</sup> | Adjusted<br>Count | Percent of<br>Total | Cumulative<br>Total | Total of Work |            |              |              |                  |                       |                        |                        |                          |                         |       |
|------------------------------------------------------|--------|---------------------------------------|-------------------|---------------------|---------------------|---------------|------------|--------------|--------------|------------------|-----------------------|------------------------|------------------------|--------------------------|-------------------------|-------|
| State/U.S. Island Area/Foreign Country               |        |                                       |                   |                     |                     | I-95 South    | I-95 North | Route 9 East | Route 9 West | Dedham<br>Street | Highland Ave<br>South | Centre Street<br>North | Walnut Street<br>North | Chestnut<br>Street North | Nahanton<br>Street East | Total |
| Newton city, Middlesex County, Massachusetts         | 10,155 | 1                                     | 10,155            | 26.2%               | 26.2%               |               |            | 5%           |              | 5%               |                       | 30%                    | 20%                    | 30%                      | 10%                     | 100%  |
| Boston city, Suffolk County, Massachusetts           | 6,985  | 1                                     | 6,985             | 18.0%               | 44.2%               |               | 50%        | 25%          |              |                  |                       | 10%                    |                        |                          | 15%                     | 100%  |
| Waltham city, Middlesex County, Massachusetts        | 2,225  | 1                                     | 2,225             | 5.7%                | 50.0%               |               | 60%        |              |              |                  |                       | 10%                    | 10%                    | 20%                      |                         | 100%  |
| Framingham town, Middlesex County, Massachusetts     | 1,350  | 1                                     | 1,350             | 3.5%                | 53.5%               |               | 60%        |              | 40%          |                  |                       |                        |                        |                          |                         | 100%  |
| Somerville city, Middlesex County, Massachusetts     | 1,090  | 1                                     | 1,090             | 2.8%                | 56.3%               |               | 70%        |              |              |                  |                       | 15%                    | 15%                    |                          |                         | 100%  |
| Brookline town, Norfolk County, Massachusetts        | 1,090  | 1                                     | 1,090             | 2.8%                | 59.1%               |               |            | 80%          |              |                  |                       | 20%                    |                        |                          |                         | 100%  |
| Watertown Town city, Middlesex County, Massachusetts | 1,005  | 1                                     | 1,005             | 2.6%                | 61.7%               |               |            |              |              |                  |                       | 75%                    | 25%                    |                          |                         | 100%  |
| Needham town, Norfolk County, Massachusetts          | 900    | 1                                     | 900               | 2.3%                | 64.0%               |               |            |              |              |                  | 100%                  |                        |                        |                          |                         | 100%  |
| Natick town, Middlesex County, Massachusetts         | 875    | 1                                     | 875               | 2.3%                | 66.3%               |               |            |              | 100%         |                  |                       |                        |                        |                          |                         | 100%  |
| Medford city, Middlesex County, Massachusetts        | 765    | 1                                     | 765               | 2.0%                | 68.2%               |               | 100%       |              |              |                  |                       |                        |                        |                          |                         | 100%  |
| Cambridge city, Middlesex County, Massachusetts      | 760    | 1                                     | 760               | 2.0%                | 70.2%               |               | 60%        |              |              |                  |                       | 30%                    | 10%                    |                          |                         | 100%  |
| Dedham town, Norfolk County, Massachusetts           | 530    | 1                                     | 530               | 1.4%                | 71.6%               | 100%          |            |              |              |                  |                       |                        |                        |                          |                         | 100%  |
| Everett city, Middlesex County, Massachusetts        | 525    | 1                                     | 525               | 1.4%                | 72.9%               |               | 100%       |              |              |                  |                       |                        |                        |                          |                         | 100%  |
| Belmont town, Middlesex County, Massachusetts        | 505    | 1                                     | 505               | 1.3%                | 74.2%               |               | 50%        |              |              |                  |                       | 40%                    | 10%                    |                          |                         | 100%  |
| Lowell city, Middlesex County, Massachusetts         | 475    | 1                                     | 475               | 1.2%                | 75.5%               |               | 100%       |              |              |                  |                       |                        |                        |                          |                         | 100%  |
| Wellesley town, Norfolk County, Massachusetts        | 475    | 1                                     | 475               | 1.2%                | 76.7%               |               |            |              | 75%          |                  | 25%                   |                        |                        |                          |                         | 100%  |
| Arlington town, Middlesex County, Massachusetts      | 470    | 1                                     | 470               | 1.2%                | 77.9%               |               | 70%        |              |              |                  |                       | 30%                    |                        |                          |                         | 100%  |
| Billerica town, Middlesex County, Massachusetts      | 465    | 1                                     | 465               | 1.2%                | 79.1%               |               | 100%       |              |              |                  |                       |                        |                        |                          |                         | 100%  |
| Norwood town, Norfolk County, Massachusetts          | 455    | 1                                     | 455               | 1.2%                | 80.3%               | 100%          |            |              |              |                  |                       |                        |                        |                          |                         | 100%  |
| Marlborough city, Middlesex County, Massachusetts    | 450    | 1                                     | 450               | 1.2%                | 81.4%               |               | 100%       |              |              |                  |                       |                        |                        |                          |                         | 100%  |
| Quincy city, Norfolk County, Massachusetts           | 445    | 1                                     | 445               | 1.1%                | 82.6%               | 100%          |            |              |              |                  |                       |                        |                        |                          |                         | 100%  |
| Malden city, Middlesex County, Massachusetts         | 355    | 1                                     | 355               | 0.9%                | 83.5%               |               | 100%       |              |              |                  |                       |                        |                        |                          |                         | 100%  |
| Ashland town, Middlesex County, Massachusetts        | 350    | 1                                     | 350               | 0.9%                | 84.4%               |               | 100%       |              |              |                  |                       |                        |                        |                          |                         | 100%  |
| Revere city, Suffolk County, Massachusetts           | 350    | 1                                     | 350               | 0.9%                | 85.3%               |               | 100%       |              |              |                  |                       |                        |                        |                          |                         | 100%  |
| Walpole town, Norfolk County, Massachusetts          | 325    | 1                                     | 325               | 0.8%                | 86.2%               | 100%          |            |              |              |                  |                       |                        |                        |                          |                         | 100%  |
| Woburn city, Middlesex County, Massachusetts         | 315    | 1                                     | 315               | 0.8%                | 87.0%               |               | 100%       |              |              |                  |                       |                        |                        |                          |                         | 100%  |
| Randolph town, Norfolk County, Massachusetts         | 305    | 1                                     | 305               | 0.8%                | 87.8%               | 100%          |            |              |              |                  |                       |                        |                        |                          |                         | 100%  |
| Canton town, Norfolk County, Massachusetts           | 295    | 1                                     | 295               | 0.8%                | 88.5%               | 100%          |            |              |              |                  |                       |                        |                        |                          |                         | 100%  |
| Milton town, Norfolk County, Massachusetts           | 295    | 1                                     | 295               | 0.8%                | 89.3%               | 100%          |            |              |              |                  |                       |                        |                        |                          |                         | 100%  |
| Lexington town, Middlesex County, Massachusetts      | 265    | 1                                     | 265               | 0.7%                | 90.0%               |               | 100%       |              |              |                  |                       |                        |                        |                          |                         | 100%  |
| Brockton city, Plymouth County, Massachusetts        | 260    | 1                                     | 260               | 0.7%                | 90.6%               | 100%          |            |              |              |                  |                       |                        |                        |                          |                         | 100%  |
| Worcester city, Worcester County, Massachusetts      | 260    | 1                                     | 260               | 0.7%                | 91.3%               |               | 100%       |              |              |                  |                       |                        |                        |                          |                         | 100%  |
| Millis town, Norfolk County, Massachusetts           | 250    | 1                                     | 250               | 0.6%                | 91.9%               | 50%           |            |              |              |                  | 50%                   |                        |                        |                          |                         | 100%  |
| Burlington town, Middlesex County, Massachusetts     | 230    | 1                                     | 230               | 0.6%                | 92.5%               |               | 100%       |              |              |                  |                       |                        |                        |                          |                         | 100%  |
| Medfield town, Norfolk County, Massachusetts         | 225    | 1                                     | 225               | 0.6%                | 93.1%               | 50%           |            |              |              |                  | 50%                   |                        |                        |                          |                         | 100%  |
| Weymouth Town city, Norfolk County, Massachusetts    | 225    | 1                                     | 225               | 0.6%                | 93.7%               | 100%          |            |              |              |                  |                       |                        |                        |                          |                         | 100%  |
| Shrewsbury town, Worcester County, Massachusetts     | 225    | 1                                     | 225               | 0.6%                | 94.3%               |               | 100%       |              |              |                  |                       |                        |                        |                          |                         | 100%  |
| Easton town, Bristol County, Massachusetts           | 220    | 1                                     | 220               | 0.6%                | 94.9%               | 100%          |            |              |              |                  |                       |                        |                        |                          |                         | 100%  |
| Braintree Town city, Norfolk County, Massachusetts   | 220    | 1                                     | 220               | 0.6%                | 95.4%               | 100%          |            |              |              |                  |                       |                        |                        |                          |                         | 100%  |
| Westwood town, Norfolk County, Massachusetts         | 215    | 1                                     | 215               | 0.6%                | 96.0%               | 80%           |            |              |              |                  | 20%                   |                        |                        |                          |                         | 100%  |
| Lynn city, Essex County, Massachusetts               | 205    | 1                                     | 205               | 0.5%                | 96.5%               |               | 100%       |              |              |                  |                       |                        |                        |                          |                         | 100%  |
| Wayland town, Middlesex County, Massachusetts        | 205    | 1                                     | 205               | 0.5%                | 97.0%               |               | 100%       |              |              |                  |                       |                        |                        |                          |                         | 100%  |
| Medway town, Norfolk County, Massachusetts           | 200    | 1                                     | 200               | 0.5%                | 97.5%               | 50%           |            |              |              |                  | 50%                   |                        |                        |                          |                         | 100%  |
| Chelmsford town, Middlesex County, Massachusetts     | 195    | 1                                     | 195               | 0.5%                | 98.1%               |               | 100%       |              |              |                  |                       |                        |                        |                          |                         | 100%  |
| Sudbury town, Middlesex County, Massachusetts        | 195    | 1                                     | 195               | 0.5%                | 98.6%               |               | 100%       |              |              |                  |                       |                        |                        |                          |                         | 100%  |
| Wilmington town, Middlesex County, Massachusetts     | 195    | 1                                     | 195               | 0.5%                | 99.1%               |               | 100%       |              |              |                  |                       |                        |                        |                          |                         | 100%  |
| Weston town, Middlesex County, Massachusetts         | 185    | 1                                     | 185               | 0.5%                | 99.5%               |               | 100%       |              |              |                  |                       |                        |                        |                          |                         | 100%  |
| Franklin Town city, Norfolk County, Massachusetts    | 180    | 1                                     | 180               | 0.5%                | 100.0%              | 100%          |            |              |              |                  |                       |                        |                        |                          |                         | 100%  |
| Totals                                               | 38,740 |                                       | 38,740            | 100.0%              |                     |               |            |              |              |                  |                       |                        |                        |                          |                         |       |
|                                                      |        |                                       |                   |                     |                     |               |            |              |              |                  |                       |                        |                        |                          |                         |       |

1 Adjustments were made to some communities based on the likelihood that people who work in those communities would opt to live closer to their place of employment or closer to transit opportunities.

Home to Work  
Live in Newton

| Workplace                                            | Count  | Adjustment<br>Percentage <sup>1</sup><br>Adjusted<br>Count<br>Percent of<br>Total<br>Cumulative<br>Total |        |        |        | Total of Work |            |              |              |               |                    |                     |                     |                       |                      |       |  |
|------------------------------------------------------|--------|----------------------------------------------------------------------------------------------------------|--------|--------|--------|---------------|------------|--------------|--------------|---------------|--------------------|---------------------|---------------------|-----------------------|----------------------|-------|--|
| State/U.S. Island Area/Foreign Country               |        |                                                                                                          |        |        |        | I-95 South    | I-95 North | Route 9 East | Route 9 West | Dedham Street | Highland Ave South | Centre Street North | Walnut Street North | Chestnut Street North | Nahanton Street East | Total |  |
|                                                      |        |                                                                                                          |        |        |        |               |            |              |              |               |                    |                     |                     |                       |                      |       |  |
| Boston city, Suffolk County, Massachusetts           | 12,204 | 1                                                                                                        | 12,204 | 26.5%  | 26.5%  |               | 50%        | 25%          |              |               |                    | 10%                 |                     |                       | 15%                  | 100%  |  |
| Newton city, Middlesex County, Massachusetts         | 11,118 | 1                                                                                                        | 11,118 | 24.1%  | 50.6%  |               |            | 5%           |              | 5%            |                    | 30%                 | 20%                 | 30%                   | 10%                  | 100%  |  |
| Cambridge city, Middlesex County, Massachusetts      | 2,972  | 1                                                                                                        | 2,972  | 6.4%   | 57.0%  |               | 60%        |              |              |               |                    | 30%                 | 10%                 |                       |                      | 100%  |  |
| Waltham city, Middlesex County, Massachusetts        | 2,018  | 1                                                                                                        | 2,018  | 4.4%   | 61.4%  |               | 60%        |              |              |               |                    | 10%                 | 10%                 | 20%                   |                      | 100%  |  |
| Wellesley town, Norfolk County, Massachusetts        | 1,048  | 1                                                                                                        | 1,048  | 2.3%   | 63.7%  |               |            |              | 75%          |               | 25%                |                     |                     |                       |                      | 100%  |  |
| Brookline town, Norfolk County, Massachusetts        | 993    | 1                                                                                                        | 993    | 2.2%   | 65.8%  |               |            | 80%          |              |               |                    | 20%                 |                     |                       |                      | 100%  |  |
| Framingham town, Middlesex County, Massachusetts     | 835    | 1                                                                                                        | 835    | 1.8%   | 67.6%  |               | 60%        |              | 40%          |               |                    |                     |                     |                       |                      | 100%  |  |
| Watertown Town city, Middlesex County, Massachusetts | 751    | 1                                                                                                        | 751    | 1.6%   | 69.2%  |               |            |              |              |               |                    | 75%                 | 25%                 |                       |                      | 100%  |  |
| Needham town, Norfolk County, Massachusetts          | 748    | 1                                                                                                        | 748    | 1.6%   | 70.9%  |               |            |              |              |               | 100%               |                     |                     |                       |                      | 100%  |  |
| Burlington town, Middlesex County, Massachusetts     | 450    | 1                                                                                                        | 450    | 1.0%   | 71.8%  |               | 100%       |              |              |               |                    |                     |                     |                       |                      | 100%  |  |
| Natick town, Middlesex County, Massachusetts         | 409    | 1                                                                                                        | 409    | 0.9%   | 72.7%  |               |            |              | 100%         |               |                    |                     |                     |                       |                      | 100%  |  |
| Lexington town, Middlesex County, Massachusetts      | 387    | 1                                                                                                        | 387    | 0.8%   | 73.6%  |               | 100%       |              |              |               |                    |                     |                     |                       |                      | 100%  |  |
| Quincy city, Norfolk County, Massachusetts           | 332    | 1                                                                                                        | 332    | 0.7%   | 74.3%  | 100%          |            |              |              |               |                    |                     |                     |                       |                      | 100%  |  |
| Belmont town, Middlesex County, Massachusetts        | 316    | 1                                                                                                        | 316    | 0.7%   | 75.0%  |               | 50%        |              |              |               |                    | 40%                 | 10%                 |                       |                      | 100%  |  |
| Lowell city, Middlesex County, Massachusetts         | 305    | 1                                                                                                        | 305    | 0.7%   | 75.6%  |               | 100%       |              |              |               |                    |                     |                     |                       |                      | 100%  |  |
| Marlborough city, Middlesex County, Massachusetts    | 285    | 1                                                                                                        | 285    | 0.6%   | 76.2%  |               | 100%       |              |              |               |                    |                     |                     |                       |                      | 100%  |  |
| Medford city, Middlesex County, Massachusetts        | 274    | 1                                                                                                        | 274    | 0.6%   | 76.8%  |               | 100%       |              |              |               |                    |                     |                     |                       |                      | 100%  |  |
| Canton town, Norfolk County, Massachusetts           | 270    | 1                                                                                                        | 270    | 0.6%   | 77.4%  | 100%          |            |              |              |               |                    |                     |                     |                       |                      | 100%  |  |
| Woburn city, Middlesex County, Massachusetts         | 251    | 1                                                                                                        | 251    | 0.5%   | 78.0%  |               | 100%       |              |              |               |                    |                     |                     |                       |                      | 100%  |  |
| Malden city, Middlesex County, Massachusetts         | 244    | 2                                                                                                        | 488    | 1.1%   | 79.0%  |               | 100%       |              |              |               |                    |                     |                     |                       |                      | 100%  |  |
| Weston town, Middlesex County, Massachusetts         | 227    | 3                                                                                                        | 681    | 1.5%   | 80.5%  |               | 80%        |              |              |               |                    |                     |                     | 20%                   |                      | 100%  |  |
| Dedham town, Norfolk County, Massachusetts           | 222    | 4                                                                                                        | 888    | 1.9%   | 82.4%  | 100%          |            |              |              |               |                    |                     |                     |                       |                      | 100%  |  |
| Worcester city, Worcester County, Massachusetts      | 222    | 5                                                                                                        | 1,110  | 2.4%   | 84.8%  |               | 100%       |              |              |               |                    |                     |                     |                       |                      | 100%  |  |
| Stoneham town, Middlesex County, Massachusetts       | 205    | 6                                                                                                        | 1,230  | 2.7%   | 87.5%  |               | 100%       |              |              |               |                    |                     |                     |                       |                      | 100%  |  |
| Somerville city, Middlesex County, Massachusetts     | 189    | 7                                                                                                        | 1,323  | 2.9%   | 90.4%  |               | 70%        |              |              |               |                    | 15%                 | 15%                 |                       |                      | 100%  |  |
| Bedford town, Middlesex County, Massachusetts        | 179    | 8                                                                                                        | 1,432  | 3.1%   | 93.5%  |               | 100%       |              |              |               |                    |                     |                     |                       |                      | 100%  |  |
| Chelmsford town, Middlesex County, Massachusetts     | 162    | 9                                                                                                        | 1,458  | 3.2%   | 96.6%  |               | 100%       |              |              |               |                    |                     |                     |                       |                      | 100%  |  |
| Billerica town, Middlesex County, Massachusetts      | 155    | 10                                                                                                       | 1,550  | 3.4%   | 100.0% |               | 100%       |              |              |               |                    |                     |                     |                       |                      | 100%  |  |
| Totals                                               | 35,966 |                                                                                                          | 46,126 | 100.0% |        |               |            |              |              |               |                    |                     |                     |                       |                      |       |  |
|                                                      |        |                                                                                                          |        |        |        |               |            |              |              |               |                    |                     |                     |                       |                      |       |  |

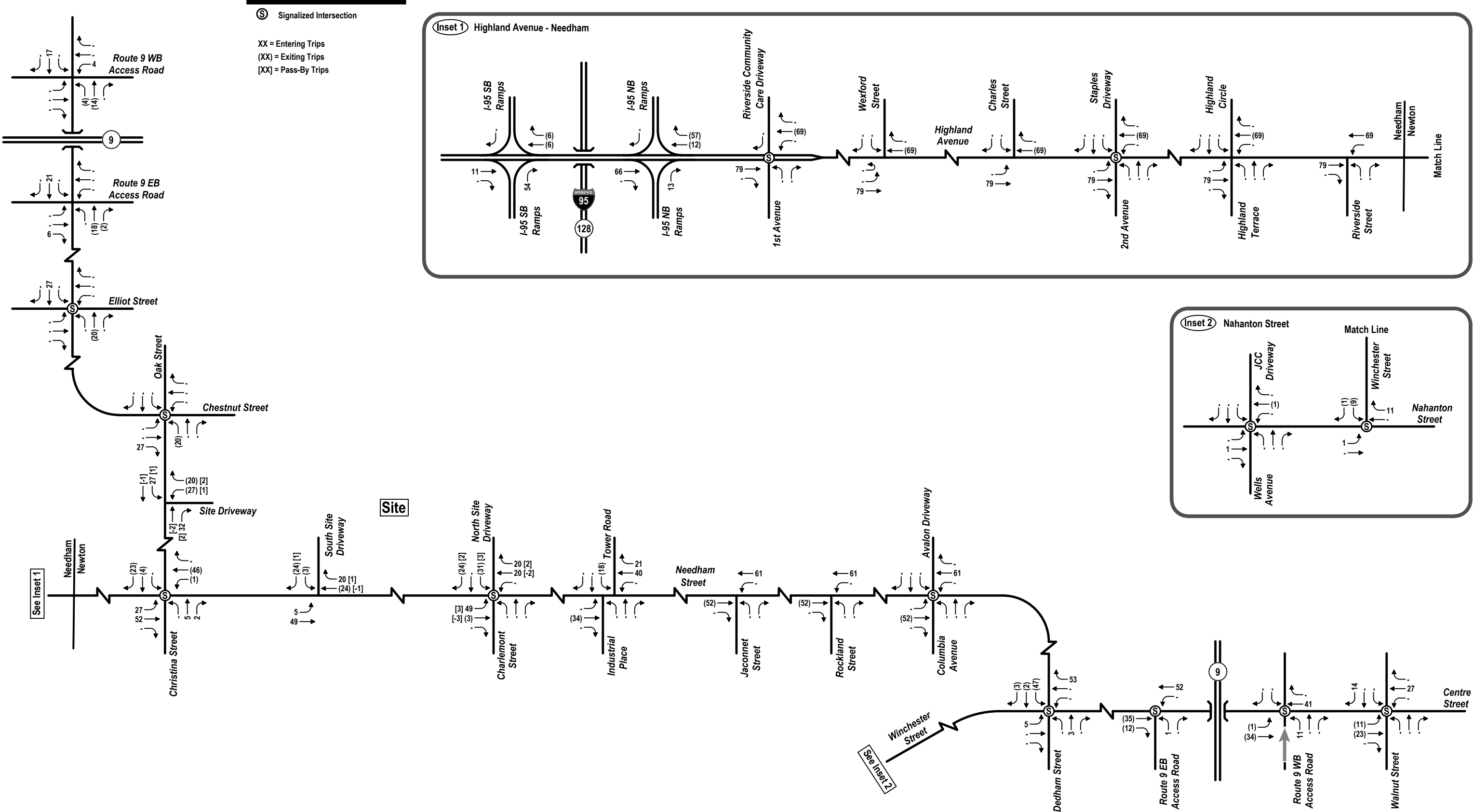
1 Adjustments were made to some communities based on the likelihood that people who work in those communities would opt to live closer to their place of employment or closer to transit opportunities.



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## Site-Generated Traffic Volume Networks

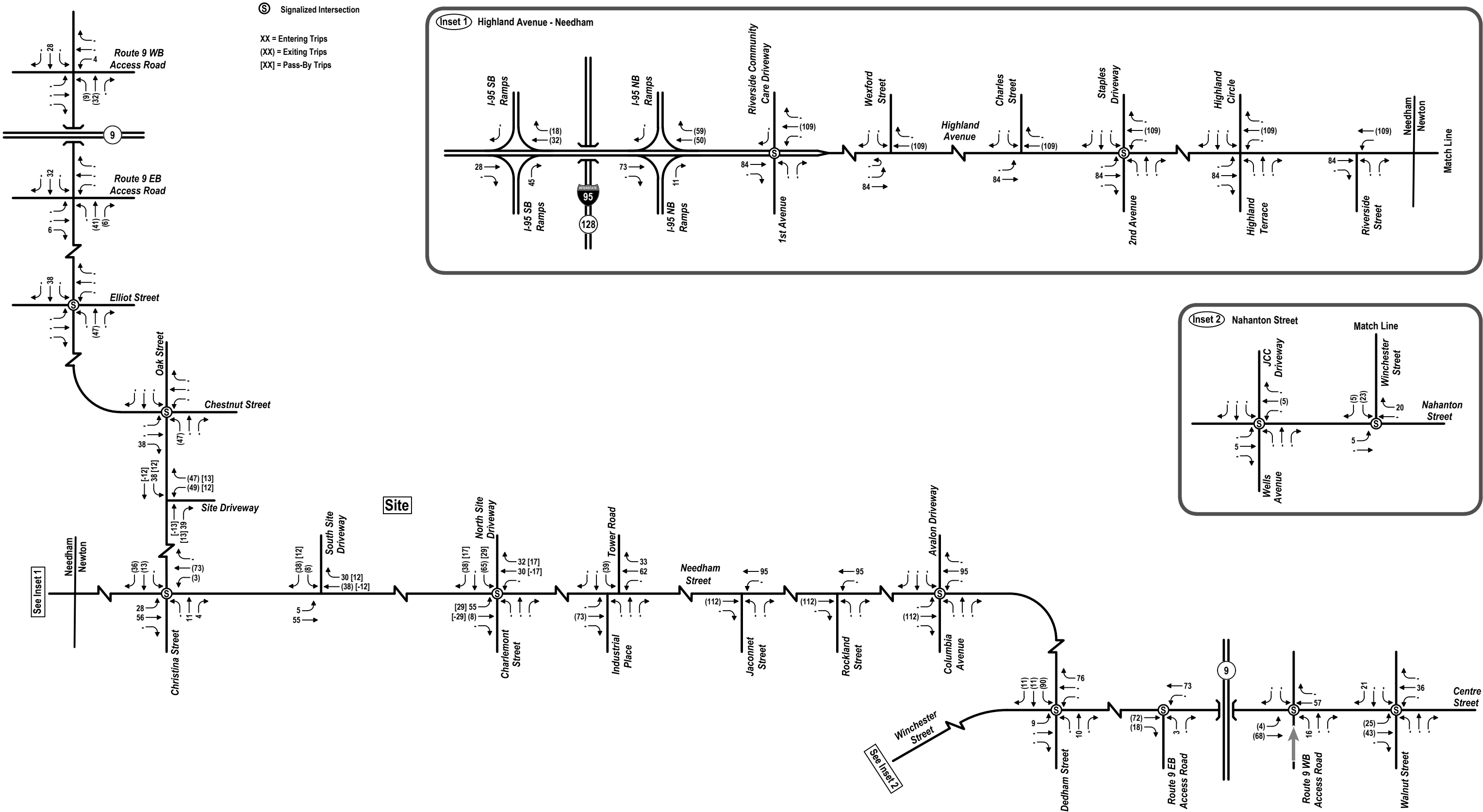




Not to Scale

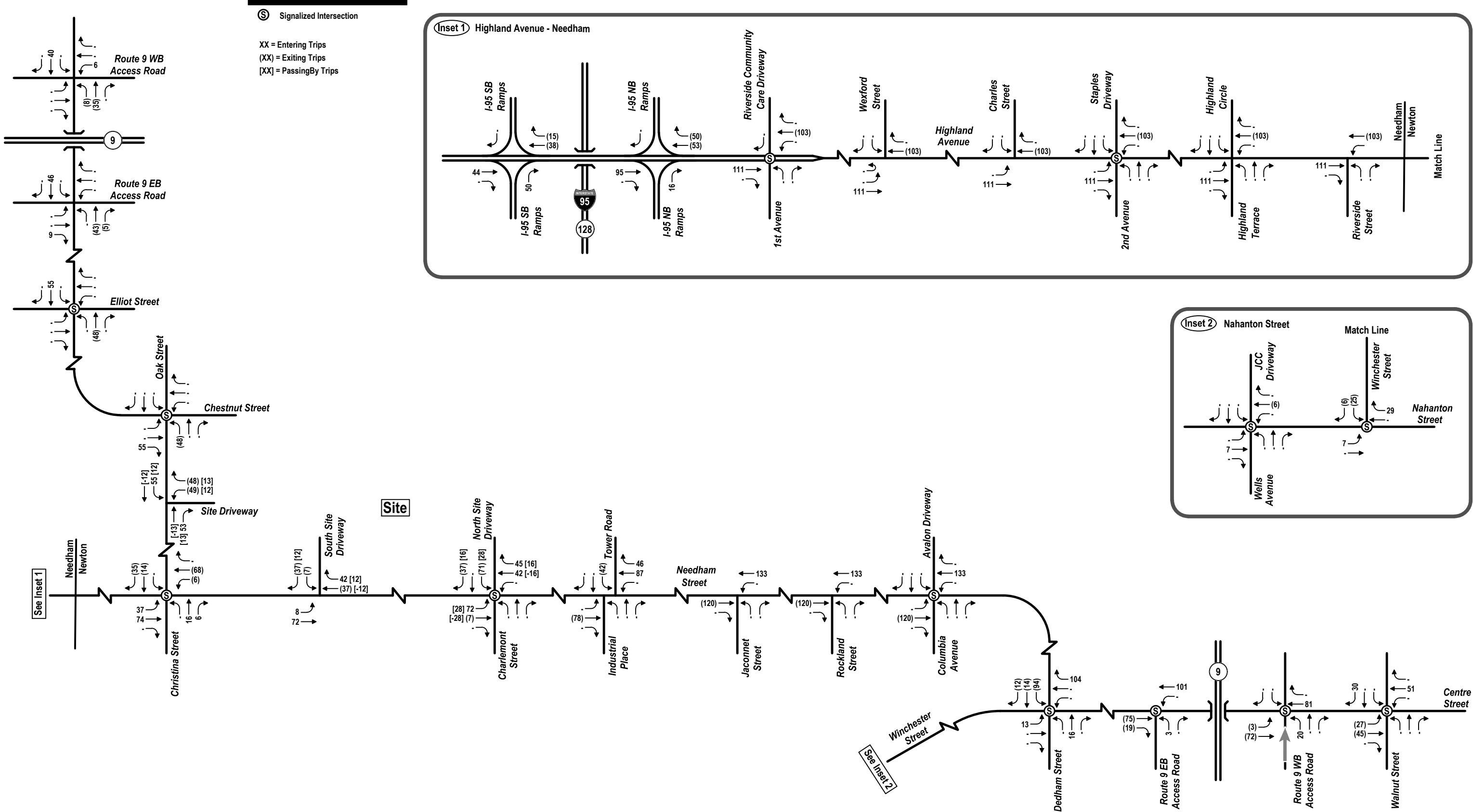


Site-Generated Traffic Volumes  
With Robust Shuttle Service  
Weekday Morning Peak Hour  
The Northland Newton Development



➔

Not to Scale

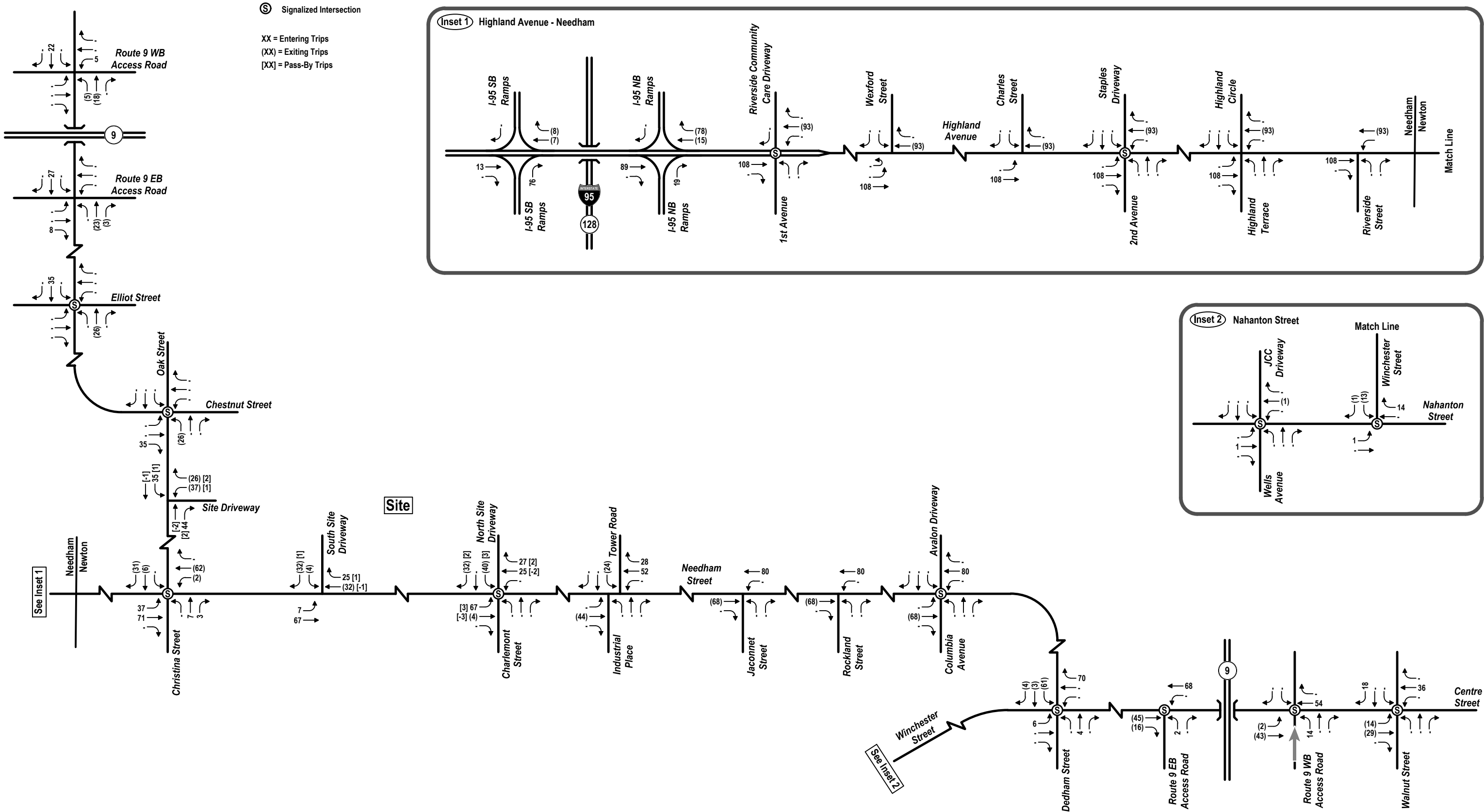


Not to Scale



Site-Generated Traffic Volumes  
With Robust Shuttle Service  
Saturday Midday Peak Hour  
The Northland Newton Development



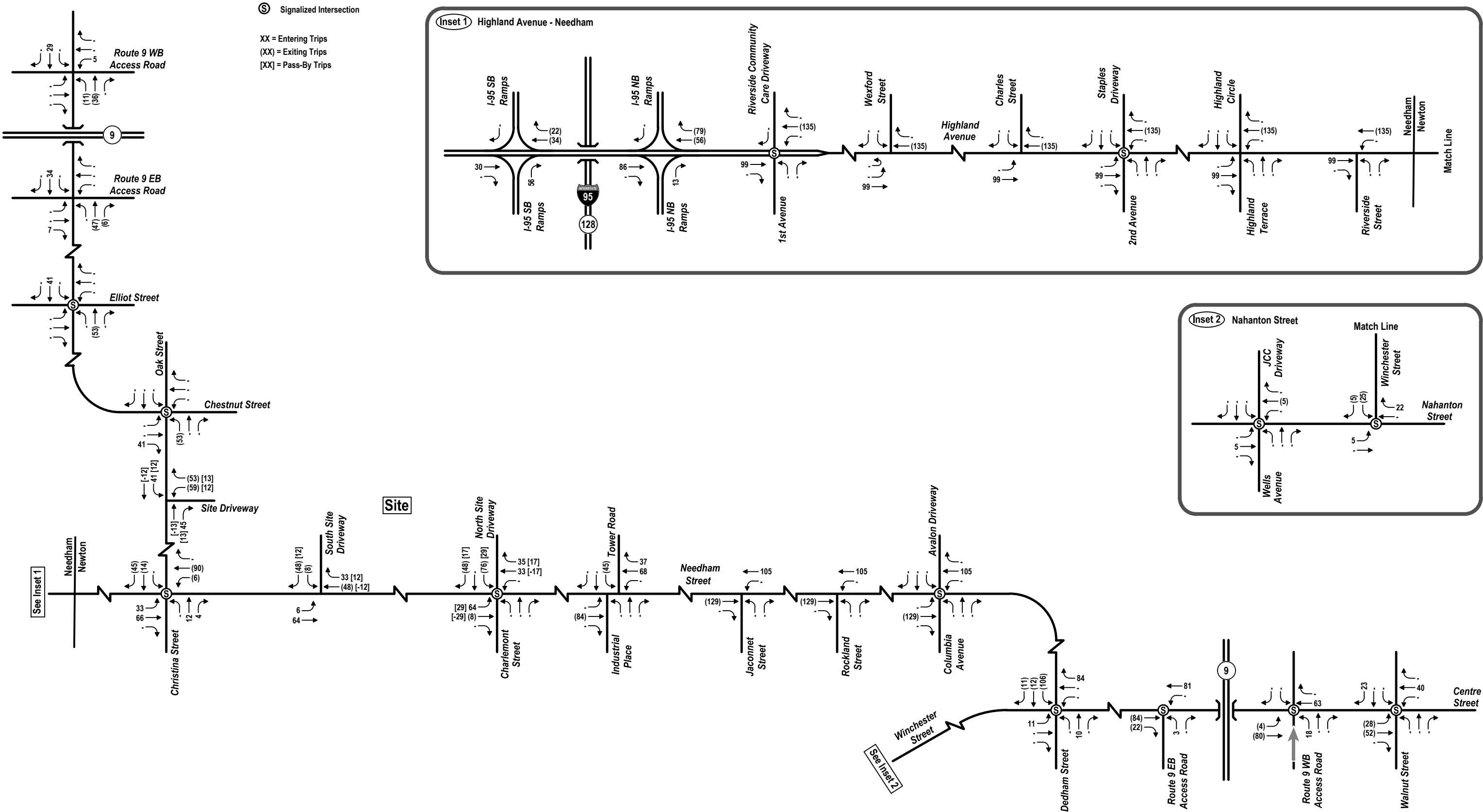


Not to Scale



Site-Generated Traffic Volumes  
With Existing Mode Share  
Weekday Morning Peak Hour  
The Northland Newton Development

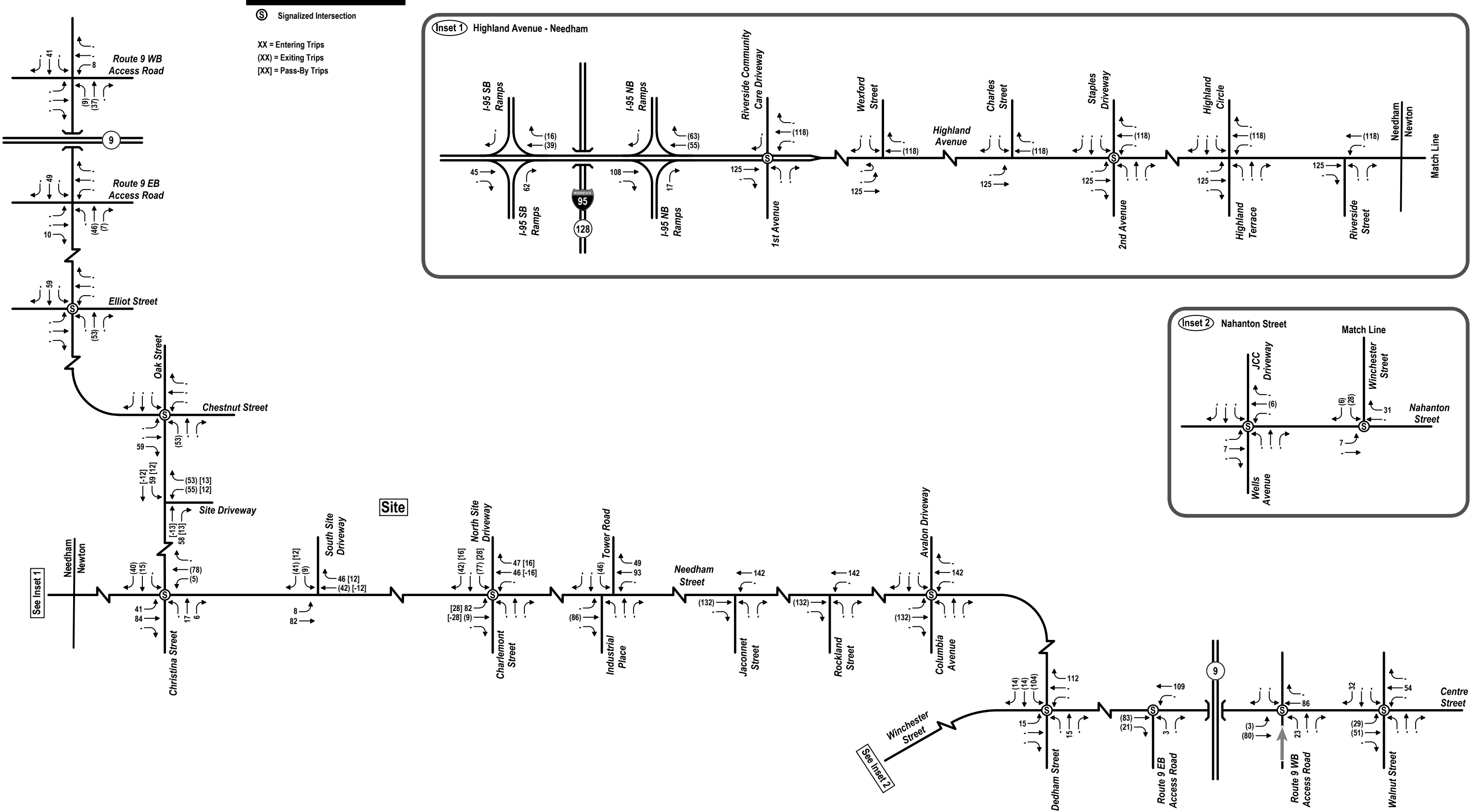




Not to Scale



Site-Generated Traffic Volumes  
With Existing Mode Share  
Weekday Evening Peak Hour  
The Northland Newton Development



Not to Scale



Site-Generated Traffic Volumes  
With Existing Mode Share  
Saturday Midday Peak Hour  
The Northland Newton Development





# Stopping Sight Distance and Intersection Sight Distance Calculator [v0.97]

## Based on 'A Policy on Geometric Design of Highways and Streets', AASHTO, 2004

| Section I                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |  |                          |                     | Section III                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |  |            |  |  |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|--------------------------|---------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|------------|--|--|
| <b>Project Information</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |  |                          |                     | <b>ISD and SSD Calculations</b> (rounded up to the next highest 5 feet) [sources: SSD - AASHTO, pp.110-117; ISD - AASHTO, pp. 650 - 664]                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |  |            |  |  |
| Project Number: 12239.00                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |  | Analyst: VHB             |                     | Cases are described in detail on subsequent pages. In summary...<br>B1: left turn from minor road, from stop control<br>B2: right turn from minor road, from stop control<br>B3: crossing maneuver from minor road, from stop control, assuming left- and right turns are not permitted [otherwise, case B1 or B2 would supercede]                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |  |            |  |  |
| City/Town, State: Newton, Massachusetts                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |  | Client: Northland Invst. |                     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |  |            |  |  |
| Location: Proposed Oak Street Driveway                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |  |                          |                     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |  |            |  |  |
| <b>Street Names and Directions</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |  |                          | <b>Street Notes</b> |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |  |            |  |  |
| Major Street name: Oak Street                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |  | NB/SB                    |                     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |  |            |  |  |
| Minor Street name: Site Driveway                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |  | EB/WB                    |                     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |  |            |  |  |
| Minor Street intersects from the:                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |  | east                     |                     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |  |            |  |  |
| The minor street <i>predominantly</i> serves...                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |  | Passenger Cars           |                     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |  |            |  |  |
| Sight distance location intersection is...                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |  | Proposed                 |                     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |  |            |  |  |
| Total number of lanes on Major Street is...                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |  | 2                        |                     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |  |            |  |  |
| <b>Grade Information</b> [enter down slope as a negative number]                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |  |                          |                     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |  |            |  |  |
| Major Street Approach Grade:                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |  | 0.00% NB                 |                     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |  |            |  |  |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |  | 0.00% SB                 |                     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |  |            |  |  |
| Minor Street Approach Grade:                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |  | 0.00% SB                 |                     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |  |            |  |  |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |  | 0.00% NB                 |                     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |  |            |  |  |
| <b>Major Street Speed Information</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |  |                          |                     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |  |            |  |  |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |  | Posted                   |                     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |  | Observed * |  |  |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |  | -                        |                     | NB                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |  | 34         |  |  |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |  | -                        |                     | SB                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |  | 30         |  |  |
| * note: off-peak 85th percentile speeds                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |  |                          |                     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |  |            |  |  |
| <b>Section II</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |  |                          |                     | <b>Section IV</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |  |            |  |  |
| <b>ISD and SSD Observations</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |  |                          |                     | <b>AASHTO Guidance</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |  |            |  |  |
| Instructions on how to observe and measure ISD and SSD are included on subsequent pages.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |  |                          |                     | Refer to AASHTO for specific guidance on SSD and ISD if presented with an unusual/atypical case.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |  |            |  |  |
| <p><b>ISD</b> - Intersection sight distance is the distance that is based on the time required for perception, reaction and completion of the desired critical exiting maneuver [typically, a left turn] once the driver on a minor street approach [or a site drive] decides to execute the maneuver. Calculation for the critical ISD includes the time to [1] turn left, and to clear the near half of the intersection without conflicting with the vehicles approaching from the left; and [2] upon turning left, to accelerate to the operating speed on the roadway without causing approaching vehicles on the main road to unduly reduce their speed. In this context, ISD can be considered as a <i>desirable</i> visibility criterion for the safe operation of an unsignalized intersection.</p> <p><b>SSD</b> - Stopping sight distance is the distance required for a vehicle approaching an intersection from either direction to perceive, react, and come to a complete stop before colliding with the exiting vehicle from a driveway. In this respect, SSD can be considered as the <i>minimum</i> visibility criterion for the safe operation of an unsignalized intersection.</p> |  |                          |                     | <p>Adequate ISD is not needed at signalized intersections, assuming traffic signal heads are visible on all approaches. Any object that would obstruct the driver's view should be removed or lowered, if practical. Such objects include buildings, parked cars, highway structures, hedges/vegetation/trees/bushes/unmowed lawn, walls, fences, and terrain.</p> <p>For ISD, an object should be considered an obstruction if it obstructs the vision of a driver whose eye height is 3.5 feet above the roadway surface and the object to be seen is 3.5 feet above the surface of the intersecting road.</p> <p>Where horizontal sight restrictions occur on downgrades, particularly at the ends of long downgrades, it is desirable to provide SSD that exceeds those values indicated above (refer to page 114 of AASHTO).</p> |  |            |  |  |
| <p><b>Limiting Factors:</b></p> <p><b>Observed ISD:</b> 420 looking left [south] horizontal curve<br/>           (rounded to nearest 5 feet) 330 looking right [north] horizontal curve</p> <p><b>Observed SSD:</b> 435 traveling NB horizontal curve<br/>           (rounded to nearest 5 feet) 400 traveling SB horizontal curve</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |  |                          |                     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |  |            |  |  |

# Stopping Sight Distance and Intersection Sight Distance Calculator [v0.97]

## Based on 'A Policy on Geometric Design of Highways and Streets', AASHTO, 2004

| Section I                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |  |                           |                     | Section III                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |  |  |  |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|---------------------------|---------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|--|--|
| <b>Project Information</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |  |                           |                     | <b>ISD and SSD Calculations</b> (rounded up to the next highest 5 feet) [sources: SSD - AASHTO, pp.110-117; ISD - AASHTO, pp. 650 - 664]                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |  |  |  |
| Project Number: 12239.00                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |  | Analyst: VHB              |                     | Cases are described in detail on subsequent pages. In summary...<br>B1: left turn from minor road, from stop control<br>B2: right turn from minor road, from stop control<br>B3: crossing maneuver from minor road, from stop control, assuming left- and right turns are not permitted [otherwise, case B1 or B2 would supercede]                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |  |  |  |
| City/Town, State: Newton, Massachusetts                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |  | Client: Northland Invst.  |                     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |  |  |  |
| Location: Prop Needham St South Driveway                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |  |                           |                     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |  |  |  |
| <b>Street Names and Directions</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |  |                           | <b>Street Notes</b> |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |  |  |  |
| Major Street name: Needham Street                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |  | NB/SB                     |                     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |  |  |  |
| Minor Street name: South Site Driveway                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |  | EB/WB                     |                     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |  |  |  |
| Minor Street intersects from the:                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |  | west                      |                     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |  |  |  |
| The minor street <i>predominantly</i> serves...                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |  | Passenger Cars            |                     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |  |  |  |
| Sight distance location intersection is...                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |  | Proposed                  |                     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |  |  |  |
| Total number of lanes on Major Street is...                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |  | 2                         |                     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |  |  |  |
| <b>Grade Information</b> [enter down slope as a negative number]                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |  |                           |                     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |  |  |  |
| Major Street Approach Grade:                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |  | 0.00% NB                  |                     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |  |  |  |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |  | 0.00% SB                  |                     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |  |  |  |
| Minor Street Approach Grade:                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |  | 0.00% NB                  |                     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |  |  |  |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |  | 0.00% SB                  |                     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |  |  |  |
| <b>Major Street Speed Information</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |  |                           |                     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |  |  |  |
| Posted                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |  | Observed *                |                     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |  |  |  |
| -                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |  | NB                        |                     | 30                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |  |  |  |
| -                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |  | SB                        |                     | 30                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |  |  |  |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |  |                           |                     | * note: off-peak 85th percentile speeds                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |  |  |  |
| <b>Section II</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |  |                           |                     | <b>Section IV</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |  |  |  |
| <b>ISD and SSD Observations</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |  |                           |                     | <b>AASHTO Guidance</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |  |  |  |
| Instructions on how to observe and measure ISD and SSD are included on subsequent pages.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |  |                           |                     | Refer to AASHTO for specific guidance on SSD and ISD if presented with an unusual/atypical case.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |  |  |  |
| <p><b>ISD</b> - Intersection sight distance is the distance that is based on the time required for perception, reaction and completion of the desired critical exiting maneuver [typically, a left turn] once the driver on a minor street approach [or a side drive] decides to execute the maneuver. Calculation for the critical ISD includes the time to [1] turn left, and to clear the near half of the intersection without conflicting with the vehicles approaching from the left; and [2] upon turning left, to accelerate to the operating speed on the roadway without causing approaching vehicles on the main road to unduly reduce their speed. In this context, ISD can be considered as a <i>desirable</i> visibility criterion for the safe operation of an unsignalized intersection.</p> <p><b>SSD</b> - Stopping sight distance is the distance required for a vehicle approaching an intersection from either direction to perceive, react, and come to a complete stop before colliding with the exiting vehicle from a driveway. In this respect, SSD can be considered as the <i>minimum</i> visibility criterion for the safe operation of an unsignalized intersection.</p> |  |                           |                     | <p>Adequate ISD is not needed at signalized intersections, assuming traffic signal heads are visible on all approaches. Any object that would obstruct the driver's view should be removed or lowered, if practical. Such objects include buildings, parked cars, highway structures, hedges/vegetation/trees/bushes/unmowed lawn, walls, fences, and terrain.</p> <p>For ISD, an object should be considered an obstruction if it obstructs the vision of a driver whose eye height is 3.5 feet above the roadway surface and the object to be seen is 3.5 feet above the surface of the intersecting road.</p> <p>Where horizontal sight restrictions occur on downgrades, particularly at the ends of long downgrades, it is desirable to provide SSD that exceeds those values indicated above (refer to page 114 of AASHTO).</p> |  |  |  |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |  |                           |                     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |  |  |  |
| <b>Limiting Factors:</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |  |                           |                     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |  |  |  |
| <b>Observed ISD:</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |  | 750 looking left [north]  |                     | *Past Signalized Intersection                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |  |  |  |
| (rounded to nearest 5 feet)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |  | 350 looking right [south] |                     | *Past Future Signalized Intersection                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |  |  |  |
| <b>Observed SSD:</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |  | 875 traveling NB          |                     | *Past Signalized Intersection                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |  |  |  |
| (rounded to nearest 5 feet)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |  | 1050 traveling SB         |                     | *Past Future Signalized Intersection                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |  |  |  |



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## Intersection Capacity Analyses – With Robust Shuttle Service





**Table A-1 Signalized Intersection Capacity Analysis**

| Location / Movement                       | 2018 Existing Condition |                  |                  |                   |                   | 2025 No-Build Condition |           |          |      |      | 2025 Build Condition with Robust Shuttle Service |           |          |      |      |
|-------------------------------------------|-------------------------|------------------|------------------|-------------------|-------------------|-------------------------|-----------|----------|------|------|--------------------------------------------------|-----------|----------|------|------|
|                                           | v/c <sup>a</sup>        | Del <sup>b</sup> | LOS <sup>c</sup> | 50 Q <sup>d</sup> | 95 Q <sup>e</sup> | v/c                     | Del       | LOS      | 50 Q | 95 Q | v/c                                              | Del       | LOS      | 50 Q | 95 Q |
| <b>3: Chestnut Street at Eliot Street</b> |                         |                  |                  |                   |                   |                         |           |          |      |      |                                                  |           |          |      |      |
| <i>Weekday Morning</i>                    |                         |                  |                  |                   |                   |                         |           |          |      |      |                                                  |           |          |      |      |
| EB L/T/R                                  | 0.94                    | 43               | D                | 197               | #734              | 1.10                    | 89        | F        | ~326 | #805 | 1.11                                             | 93        | F        | ~333 | #805 |
| WB L/T/R                                  | 0.12                    | 10               | B                | 12                | 63                | 0.13                    | 11        | B        | 13   | 61   | 0.13                                             | 11        | B        | 14   | 61   |
| NB L/T/R                                  | 0.51                    | 23               | C                | 61                | 162               | 0.47                    | 21        | C        | 68   | 177  | 0.48                                             | 22        | C        | 74   | 190  |
| SB L/T/R                                  | 0.80                    | 31               | C                | 120               | 298               | 0.82                    | 32        | C        | 157  | #424 | 0.82                                             | 32        | C        | 161  | #433 |
| <b>Total</b>                              |                         | <b>34</b>        | <b>C</b>         |                   |                   |                         | <b>56</b> | <b>E</b> |      |      |                                                  | <b>57</b> | <b>E</b> |      |      |
| <i>Weekday Evening</i>                    |                         |                  |                  |                   |                   |                         |           |          |      |      |                                                  |           |          |      |      |
| EB L/T/R                                  | 0.95                    | 57               | E                | 218               | #657              | 1.13                    | 114       | F        | ~329 | #686 | >1.20                                            | >120      | F        | ~356 | #696 |
| WB L/T/R                                  | 0.35                    | 22               | C                | 76                | 223               | 0.43                    | 27        | C        | 110  | 241  | 0.46                                             | 29        | C        | 115  | 241  |
| NB L/T/R                                  | 0.56                    | 21               | C                | 94                | 233               | 0.61                    | 22        | C        | 128  | 313  | 0.61                                             | 21        | C        | 142  | 346  |
| SB L/T/R                                  | 0.87                    | 33               | C                | 239               | #600              | 0.87                    | 31        | C        | 290  | #717 | 0.86                                             | 31        | C        | 322  | #781 |
| <b>Total</b>                              |                         | <b>36</b>        | <b>D</b>         |                   |                   |                         | <b>51</b> | <b>D</b> |      |      |                                                  | <b>62</b> | <b>E</b> |      |      |
| <i>Saturday Midday</i>                    |                         |                  |                  |                   |                   |                         |           |          |      |      |                                                  |           |          |      |      |
| EB L/T/R                                  | 0.75                    | 32               | C                | 117               | #367              | 0.82                    | 39        | D        | 140  | #402 | 0.83                                             | 40        | D        | 140  | #403 |
| WB L/T/R                                  | 0.30                    | 17               | B                | 42                | 130               | 0.31                    | 17        | B        | 48   | 133  | 0.31                                             | 17        | B        | 48   | 133  |
| NB L/T/R                                  | 0.59                    | 26               | C                | 80                | 220               | 0.63                    | 28        | C        | 101  | #288 | 0.72                                             | 32        | C        | 123  | #356 |
| SB L/T/R                                  | 0.80                    | 32               | C                | 152               | #432              | 0.83                    | 35        | C        | 193  | #522 | 0.90                                             | 42        | D        | 225  | #598 |
| <b>Total</b>                              |                         | <b>28</b>        | <b>C</b>         |                   |                   |                         | <b>32</b> | <b>C</b> |      |      |                                                  | <b>36</b> | <b>D</b> |      |      |
| <b>4: Chestnut Street at Oak Street</b>   |                         |                  |                  |                   |                   |                         |           |          |      |      |                                                  |           |          |      |      |
| <i>Weekday Morning</i>                    |                         |                  |                  |                   |                   |                         |           |          |      |      |                                                  |           |          |      |      |
| EB L/T/R                                  | 0.61                    | 10               | A                | 10                | 86                | 0.66                    | 10        | A        | 11   | 92   | 0.67                                             | 10        | A        | 11   | 93   |
| WB L/T/R                                  | 0.46                    | 31               | C                | 15                | 56                | 0.43                    | 30        | C        | 14   | 57   | 0.42                                             | 28        | C        | 14   | 57   |
| NB L/T/R                                  | 0.59                    | 16               | B                | 68                | #361              | 0.61                    | 17        | B        | 73   | #407 | 0.64                                             | 18        | B        | 78   | #436 |
| SB L/T/R                                  | 0.06                    | 9                | A                | 6                 | 37                | 0.06                    | 9         | A        | 5    | 39   | 0.06                                             | 9         | A        | 5    | 39   |
| <b>Total</b>                              |                         | <b>14</b>        | <b>B</b>         |                   |                   |                         | <b>14</b> | <b>B</b> |      |      |                                                  | <b>15</b> | <b>B</b> |      |      |
| <i>Weekday Evening</i>                    |                         |                  |                  |                   |                   |                         |           |          |      |      |                                                  |           |          |      |      |
| EB L/T/R                                  | 0.61                    | 10               | B                | 11                | 59                | 0.61                    | 10        | B        | 9    | 81   | 0.63                                             | 10        | A        | 10   | 85   |
| WB L/T/R                                  | 0.42                    | 28               | C                | 18                | 64                | 0.43                    | 29        | C        | 17   | 64   | 0.45                                             | 30        | C        | 18   | 65   |
| NB L/T/R                                  | 0.57                    | 16               | B                | 61                | #329              | 0.67                    | 19        | B        | 71   | #407 | 0.72                                             | 21        | C        | 86   | #462 |
| SB L/T/R                                  | 0.16                    | 9                | A                | 17                | 90                | 0.17                    | 9         | A        | 17   | 95   | 0.17                                             | 9         | A        | 19   | 99   |
| <b>Total</b>                              |                         | <b>14</b>        | <b>B</b>         |                   |                   |                         | <b>15</b> | <b>B</b> |      |      |                                                  | <b>16</b> | <b>B</b> |      |      |
| <i>Saturday Midday</i>                    |                         |                  |                  |                   |                   |                         |           |          |      |      |                                                  |           |          |      |      |
| EB L/T/R                                  | 0.58                    | 8                | A                | 6                 | 81                | 0.64                    | 9         | A        | 7    | 86   | 0.70                                             | 10        | A        | 8    | 92   |
| WB L/T/R                                  | 0.19                    | 20               | B                | 8                 | 33                | 0.17                    | 20        | C        | 7    | 36   | 0.20                                             | 22        | C        | 8    | 36   |
| NB L/T/R                                  | 0.59                    | 17               | B                | 49                | #244              | 0.59                    | 17        | B        | 52   | #318 | 0.62                                             | 18        | B        | 63   | #392 |
| SB L/T/R                                  | 0.18                    | 10               | A                | 15                | 83                | 0.17                    | 10        | A        | 15   | 89   | 0.15                                             | 10        | A        | 15   | 91   |
| <b>Total</b>                              |                         | <b>12</b>        | <b>B</b>         |                   |                   |                         | <b>13</b> | <b>B</b> |      |      |                                                  | <b>14</b> | <b>B</b> |      |      |

a Volume to capacity ratio.

b Average total delay, in seconds per vehicle.

c Level-of-service.

d 50th percentile queue, in feet.

e 95th percentile queue, in feet.

~ Volume exceeds capacity, queue is theoretically infinite.

# 95th percentile volume exceeds capacity, queue may be longer.

**Table A-1 Signalized Intersection Capacity Analysis (continued)**

| Location /<br>Movement                                    | 2018 Existing Condition |                  |                  |                   |                   | 2025 No-Build Condition |           |          |      |       | 2025 Build Condition<br>with Robust Shuttle Service |           |          |      |       |
|-----------------------------------------------------------|-------------------------|------------------|------------------|-------------------|-------------------|-------------------------|-----------|----------|------|-------|-----------------------------------------------------|-----------|----------|------|-------|
|                                                           | v/c <sup>a</sup>        | Del <sup>b</sup> | LOS <sup>c</sup> | 50 Q <sup>d</sup> | 95 Q <sup>e</sup> | v/c                     | Del       | LOS      | 50 Q | 95 Q  | v/c                                                 | Del       | LOS      | 50 Q | 95 Q  |
| <b>6: Needham Street at Oak Street / Christina Street</b> |                         |                  |                  |                   |                   |                         |           |          |      |       |                                                     |           |          |      |       |
| <i>Weekday Morning</i>                                    |                         |                  |                  |                   |                   |                         |           |          |      |       |                                                     |           |          |      |       |
| EB L/T                                                    | 0.65                    | 31               | C                | 81                | #212              | >1.20                   | >120      | F        | ~289 | #480  | >1.20                                               | >120      | F        | ~286 | #478  |
| EB R                                                      | 0.23                    | 5                | A                | 0                 | 38                | 0.24                    | 8         | A        | 19   | 67    | 0.26                                                | 8         | A        | 21   | 71    |
| WB L                                                      | N/A                     | N/A              | N/A              | N/A               | N/A               | 0.73                    | 65        | E        | 99   | #224  | 0.73                                                | 65        | E        | 99   | #224  |
| WB T/R                                                    | N/A                     | N/A              | N/A              | N/A               | N/A               | 0.52                    | 44        | D        | 158  | 267   | 0.52                                                | 44        | D        | 158  | 267   |
| WB L/T/R                                                  | 0.85                    | 44               | D                | 130               | #327              | N/A                     | N/A       | N/A      | N/A  | N/A   | N/A                                                 | N/A       | N/A      | N/A  | N/A   |
| NB L                                                      | 0.63                    | 27               | C                | 32                | #96               | 0.95                    | 81        | F        | 114  | #294  | 0.79                                                | 53        | D        | 81   | #215  |
| NB T/R                                                    | 0.83                    | 22               | C                | 218               | 347               | 0.76                    | 21        | C        | 431  | 754   | 0.81                                                | 24        | C        | 485  | 854   |
| SB L                                                      | 0.19                    | 11               | B                | 6                 | 20                | 0.18                    | 21        | C        | 13   | 41    | 0.23                                                | 24        | C        | 14   | 44    |
| SB T/R                                                    | 0.78                    | 19               | B                | 194               | 309               | 0.96                    | 59        | E        | 608  | #1025 | 0.97                                                | 61        | E        | 623  | #1043 |
| <b>Total</b>                                              |                         | <b>25</b>        | <b>C</b>         |                   |                   |                         | <b>60</b> | <b>E</b> |      |       |                                                     | <b>57</b> | <b>E</b> |      |       |
| <i>Weekday Evening</i>                                    |                         |                  |                  |                   |                   |                         |           |          |      |       |                                                     |           |          |      |       |
| EB L/T                                                    | 0.79                    | 41               | D                | 104               | #287              | >1.20                   | >120      | F        | ~332 | #545  | 1.19                                                | >120      | F        | ~293 | #500  |
| EB R                                                      | 0.28                    | 6                | A                | 3                 | 44                | 0.37                    | 12        | B        | 47   | 114   | 0.34                                                | 11        | B        | 37   | 97    |
| WB L                                                      | N/A                     | N/A              | N/A              | N/A               | N/A               | 1.08                    | >120      | F        | ~110 | #249  | 0.92                                                | 102       | F        | 97   | #232  |
| WB T/R                                                    | N/A                     | N/A              | N/A              | N/A               | N/A               | 0.41                    | 38        | D        | 113  | 193   | 0.45                                                | 39        | D        | 125  | 210   |
| WB L/T/R                                                  | 0.89                    | 54               | D                | 112               | #330              | N/A                     | N/A       | N/A      | N/A  | N/A   | N/A                                                 | N/A       | N/A      | N/A  | N/A   |
| NB L                                                      | 0.84                    | 52               | D                | 44                | #154              | 0.78                    | 50        | D        | 80   | #204  | 0.87                                                | 63        | E        | 98   | #248  |
| NB T/R                                                    | 0.79                    | 19               | B                | 212               | 325               | 0.74                    | 21        | C        | 411  | 725   | 0.79                                                | 23        | C        | 469  | #832  |
| SB L                                                      | 0.21                    | 11               | B                | 7                 | 22                | 0.23                    | 22        | C        | 18   | 48    | 0.33                                                | 27        | C        | 22   | 61    |
| SB T/R                                                    | 0.81                    | 21               | C                | 222               | 343               | 1.04                    | 86        | F        | ~791 | #1113 | 1.11                                                | 95        | F        | ~895 | #1225 |
| <b>Total</b>                                              |                         | <b>28</b>        | <b>C</b>         |                   |                   |                         | <b>68</b> | <b>E</b> |      |       |                                                     | <b>67</b> | <b>E</b> |      |       |
| <i>Saturday Midday</i>                                    |                         |                  |                  |                   |                   |                         |           |          |      |       |                                                     |           |          |      |       |
| EB L/T                                                    | 0.88                    | 52               | D                | 122               | #285              | >1.20                   | >120      | F        | ~318 | #490  | >1.20                                               | >120      | F        | ~334 | #510  |
| EB R                                                      | 0.26                    | 5                | A                | 0                 | 39                | 0.26                    | 8         | A        | 23   | 67    | 0.28                                                | 8         | A        | 27   | 74    |
| WB L                                                      | N/A                     | N/A              | N/A              | N/A               | N/A               | 0.95                    | 103       | F        | 92   | #229  | 0.99                                                | 114       | F        | 93   | #232  |
| WB T/R                                                    | N/A                     | N/A              | N/A              | N/A               | N/A               | 0.35                    | 29        | C        | 71   | 139   | 0.40                                                | 31        | C        | 86   | 160   |
| WB L/T/R                                                  | 0.87                    | 50               | D                | 106               | #267              | N/A                     | N/A       | N/A      | N/A  | N/A   | N/A                                                 | N/A       | N/A      | N/A  | N/A   |
| NB L                                                      | 0.86                    | 64               | E                | 37                | #137              | 0.64                    | 31        | C        | 42   | #119  | 0.71                                                | 37        | D        | 57   | #162  |
| NB T/R                                                    | 0.69                    | 16               | B                | 177               | 279               | 0.69                    | 18        | B        | 304  | 563   | 0.76                                                | 21        | C        | 367  | 686   |
| SB L                                                      | 0.13                    | 9                | A                | 6                 | 19                | 0.16                    | 19        | B        | 14   | 39    | 0.25                                                | 22        | C        | 16   | 48    |
| SB T/R                                                    | 0.87                    | 25               | C                | 253               | #410              | 1.14                    | 102       | F        | ~775 | #1095 | >1.20                                               | >120      | F        | ~866 | #1194 |
| <b>Total</b>                                              |                         | <b>30</b>        | <b>C</b>         |                   |                   |                         | <b>76</b> | <b>E</b> |      |       |                                                     | <b>92</b> | <b>F</b> |      |       |

- a Volume to capacity ratio.  
b Average total delay, in seconds per vehicle.  
c Level-of-service.  
d 50th percentile queue, in feet.  
e 95th percentile queue, in feet.  
~ Volume exceeds capacity, queue is theoretically infinite.  
# 95th percentile volume exceeds capacity, queue may be longer.

**Table A-1 Signalized Intersection Capacity Analysis (continued)**

| Location /<br>Movement                                     | 2018 Existing Condition                                 |                  |                  |                   |                   | 2025 No-Build Condition |     |      |      |      | 2025 Build Condition<br>with Robust Shuttle Service |      |     |      |      |
|------------------------------------------------------------|---------------------------------------------------------|------------------|------------------|-------------------|-------------------|-------------------------|-----|------|------|------|-----------------------------------------------------|------|-----|------|------|
|                                                            | v/c <sup>a</sup>                                        | Del <sup>b</sup> | LOS <sup>c</sup> | 50 Q <sup>d</sup> | 95 Q <sup>e</sup> | v/c                     | Del | LOS  | 50 Q | 95 Q | v/c                                                 | Del  | LOS | 50 Q | 95 Q |
| 9: Needham Street at North Site Driveway/Charlemont Street |                                                         |                  |                  |                   |                   |                         |     |      |      |      |                                                     |      |     |      |      |
| Weekday Morning                                            |                                                         |                  |                  |                   |                   |                         |     |      |      |      |                                                     |      |     |      |      |
| EB L                                                       |                                                         | 0.04             | 30               | C                 | 3                 | 12                      |     | 0.33 | 37   | D    | 25                                                  | 48   |     |      |      |
| EB T/R                                                     |                                                         | 0.01             | 0                | A                 | 0                 | 0                       |     | 0.09 | 0    | A    | 0                                                   | 0    |     |      |      |
| WB L                                                       |                                                         | 0.19             | 34               | C                 | 13                | 36                      |     | 0.20 | 35   | C    | 13                                                  | 37   |     |      |      |
| WB T/R                                                     |                                                         | 0.04             | 0                | A                 | 0                 | 0                       |     | 0.04 | 0    | A    | 0                                                   | 0    |     |      |      |
| NB L                                                       |                                                         | 0.03             | 7                | A                 | 1                 | 14                      |     | 0.17 | 9    | A    | 7                                                   | 41   |     |      |      |
| NB T/R                                                     |                                                         | 0.59             | 11               | B                 | 139               | #733                    |     | 0.63 | 13   | B    | 154                                                 | #725 |     |      |      |
| SB L                                                       |                                                         | 0.04             | 7                | A                 | 1                 | 13                      |     | 0.06 | 9    | A    | 3                                                   | 13   |     |      |      |
| SB T/R                                                     |                                                         | 0.57             | 11               | B                 | 131               | #692                    |     | 0.69 | 18   | B    | 259                                                 | #685 |     |      |      |
| Total                                                      |                                                         |                  | 11               | B                 |                   |                         |     |      | 15   | B    |                                                     |      |     |      |      |
| Weekday Evening                                            |                                                         |                  |                  |                   |                   |                         |     |      |      |      |                                                     |      |     |      |      |
| EB L                                                       | Intersection is not signalized in Existing<br>Condition | 0.50             | 43               | D                 | 35                | 92                      |     | 0.79 | 60   | E    | 104                                                 | #210 |     |      |      |
| EB T/R                                                     |                                                         | 0.07             | 0                | A                 | 0                 | 0                       |     | 0.17 | 1    | A    | 0                                                   | 0    |     |      |      |
| WB L                                                       |                                                         | 0.22             | 35               | C                 | 15                | 48                      |     | 0.16 | 34   | C    | 19                                                  | 50   |     |      |      |
| WB T/R                                                     |                                                         | 0.18             | 20               | B                 | 6                 | 37                      |     | 0.13 | 18   | B    | 8                                                   | 37   |     |      |      |
| NB L                                                       |                                                         | 0.06             | 7                | A                 | 1                 | 18                      |     | 0.54 | 33   | C    | 21                                                  | 83   |     |      |      |
| NB T/R                                                     |                                                         | 0.66             | 13               | B                 | 194               | 712                     |     | 0.68 | 15   | B    | 253                                                 | #641 |     |      |      |
| SB L                                                       |                                                         | 0.02             | 7                | A                 | 1                 | 6                       |     | 0.02 | 11   | B    | 1                                                   | 7    |     |      |      |
| SB T/R                                                     |                                                         | 0.67             | 14               | B                 | 179               | #668                    |     | 0.93 | 37   | D    | 471                                                 | #893 |     |      |      |
| Total                                                      |                                                         |                  | 15               | B                 |                   |                         |     |      | 29   | C    |                                                     |      |     |      |      |
| Saturday Midday                                            |                                                         |                  |                  |                   |                   |                         |     |      |      |      |                                                     |      |     |      |      |
| EB L                                                       |                                                         | 0.49             | 44               | D                 | 31                | 82                      |     | 0.77 | 58   | E    | 101                                                 | #201 |     |      |      |
| EB T/R                                                     |                                                         | 0.09             | 0                | A                 | 0                 | 0                       |     | 0.19 | 1    | A    | 0                                                   | 0    |     |      |      |
| WB L                                                       |                                                         | 0.42             | 42               | D                 | 27                | 73                      |     | 0.29 | 37   | D    | 32                                                  | 75   |     |      |      |
| WB T/R                                                     |                                                         | 0.19             | 14               | B                 | 1                 | 29                      |     | 0.13 | 13   | B    | 1                                                   | 29   |     |      |      |
| NB L                                                       |                                                         | 0.06             | 7                | A                 | 1                 | 18                      |     | 0.62 | 39   | D    | 23                                                  | 98   |     |      |      |
| NB T/R                                                     |                                                         | 0.69             | 13               | B                 | 204               | #766                    |     | 0.77 | 20   | C    | 295                                                 | #817 |     |      |      |
| SB L                                                       |                                                         | 0.06             | 7                | A                 | 2                 | 12                      |     | 0.09 | 12   | B    | 4                                                   | 15   |     |      |      |
| SB T/R                                                     |                                                         | 0.68             | 14               | B                 | 184               | #705                    |     | 0.98 | 48   | D    | 522                                                 | #972 |     |      |      |
| Total                                                      |                                                         |                  | 15               | B                 |                   |                         |     |      | 35   | C    |                                                     |      |     |      |      |

- a Volume to capacity ratio.  
b Average total delay, in seconds per vehicle.  
c Level-of-service.  
d 50th percentile queue, in feet.  
e 95th percentile queue, in feet.  
# 95th percentile volume exceeds capacity, queue may be longer.

**Table A-1 Signalized Intersection Capacity Analysis (continued)**

| Location /<br>Movement                                       | 2018 Existing Condition |                  |                  |                   |                   | 2025 No-Build Condition |           |          |      |      | 2025 Build Condition<br>with Robust Shuttle Service |           |          |      |       |
|--------------------------------------------------------------|-------------------------|------------------|------------------|-------------------|-------------------|-------------------------|-----------|----------|------|------|-----------------------------------------------------|-----------|----------|------|-------|
|                                                              | v/c <sup>a</sup>        | Del <sup>b</sup> | LOS <sup>c</sup> | 50 Q <sup>d</sup> | 95 Q <sup>e</sup> | v/c                     | Del       | LOS      | 50 Q | 95 Q | v/c                                                 | Del       | LOS      | 50 Q | 95 Q  |
| <b>13: Needham Street at Columbia Avenue/Avalon Driveway</b> |                         |                  |                  |                   |                   |                         |           |          |      |      |                                                     |           |          |      |       |
| <i>Weekday Morning</i>                                       |                         |                  |                  |                   |                   |                         |           |          |      |      |                                                     |           |          |      |       |
| EB L/T                                                       | 0.10                    | 21               | C                | 8                 | 29                | 0.09                    | 30        | C        | 7    | 40   | 0.09                                                | 30        | C        | 8    | 40    |
| EB R                                                         | 0.11                    | 9                | A                | 0                 | 11                | 0.08                    | 1         | A        | 0    | 0    | 0.08                                                | 1         | A        | 0    | 0     |
| WB L/T/R                                                     | 0.15                    | 16               | B                | 6                 | 30                | 0.14                    | 22        | C        | 6    | 40   | 0.14                                                | 23        | C        | 6    | 40    |
| NB L                                                         | 0.05                    | 5                | A                | 1                 | 10                | 0.07                    | 6         | A        | 1    | 12   | 0.07                                                | 6         | A        | 1    | 12    |
| NB T/R                                                       | 0.47                    | 7                | A                | 83                | 273               | 0.52                    | 7         | A        | 110  | 377  | 0.56                                                | 8         | A        | 122  | 421   |
| SB L                                                         | 0.00                    | 5                | A                | 0                 | 2                 | 0.00                    | 5         | A        | 0    | 2    | 0.00                                                | 5         | A        | 0    | 2     |
| SB T/R                                                       | 0.58                    | 9                | A                | 118               | 391               | 0.69                    | 11        | B        | 186  | 664  | 0.70                                                | 11        | B        | 193  | #698  |
| <b>Total</b>                                                 |                         | <b>8</b>         | <b>A</b>         |                   |                   |                         | <b>10</b> | <b>A</b> |      |      |                                                     | <b>10</b> | <b>A</b> |      |       |
| <i>Weekday Evening</i>                                       |                         |                  |                  |                   |                   |                         |           |          |      |      |                                                     |           |          |      |       |
| EB L/T                                                       | 0.04                    | 23               | C                | 2                 | 17                | 0.03                    | 28        | C        | 1    | 22   | 0.04                                                | 30        | C        | 2    | 22    |
| EB R                                                         | 0.06                    | 5                | A                | 0                 | 2                 | 0.05                    | 0         | A        | 0    | 0    | 0.05                                                | 0         | A        | 0    | 0     |
| WB L/T/R                                                     | 0.04                    | 18               | B                | 1                 | 16                | 0.04                    | 23        | C        | 1    | 19   | 0.04                                                | 25        | C        | 1    | 19    |
| NB L                                                         | 0.05                    | 4                | A                | 0                 | 14                | 0.05                    | 4         | A        | 0    | 16   | 0.06                                                | 4         | A        | 0    | 16    |
| NB T/R                                                       | 0.55                    | 7                | A                | 0                 | 371               | 0.64                    | 8         | A        | 0    | 688  | 0.68                                                | 9         | A        | 0    | #911  |
| SB L                                                         | 0.00                    | 4                | A                | 0                 | 2                 | 0.00                    | 4         | A        | 0    | 2    | 0.00                                                | 4         | A        | 0    | 2     |
| SB T/R                                                       | 0.39                    | 5                | A                | 0                 | 242               | 0.48                    | 6         | A        | 0    | 373  | 0.88                                                | 6         | A        | 0    | 464   |
| <b>Total</b>                                                 |                         | <b>6</b>         | <b>A</b>         |                   |                   |                         | <b>7</b>  | <b>A</b> |      |      |                                                     | <b>8</b>  | <b>A</b> |      |       |
| <i>Saturday Midday</i>                                       |                         |                  |                  |                   |                   |                         |           |          |      |      |                                                     |           |          |      |       |
| EB L/T                                                       | 0.04                    | 21               | C                | 1                 | 16                | 0.04                    | 28        | C        | 2    | 21   | 0.04                                                | 32        | C        | 3    | 21    |
| EB R                                                         | 0.04                    | 2                | A                | 0                 | 0                 | 0.03                    | 0         | A        | 0    | 0    | 0.04                                                | 0         | A        | 0    | 0     |
| WB L/T/R                                                     | 0.07                    | 16               | B                | 1                 | 23                | 0.08                    | 23        | C        | 3    | 30   | 0.11                                                | 26        | C        | 4    | 30    |
| NB L                                                         | 0.02                    | 4                | A                | 0                 | 7                 | 0.02                    | 4         | A        | 0    | 8    | 0.03                                                | 4         | A        | 0    | 9     |
| NB T/R                                                       | 0.54                    | 6                | A                | 0                 | 378               | 0.65                    | 9         | A        | 0    | #751 | 0.71                                                | 10        | A        | 0    | #1002 |
| SB L                                                         | 0.02                    | 4                | A                | 0                 | 5                 | 0.02                    | 4         | A        | 0    | 5    | 0.02                                                | 4         | A        | 0    | 5     |
| SB T/R                                                       | 0.43                    | 5                | A                | 0                 | 248               | 0.51                    | 6         | A        | 0    | 422  | 0.58                                                | 7         | A        | 0    | 565   |
| <b>Total</b>                                                 |                         | <b>6</b>         | <b>A</b>         |                   |                   |                         | <b>8</b>  | <b>A</b> |      |      |                                                     | <b>9</b>  | <b>A</b> |      |       |

a Volume to capacity ratio.

b Average total delay, in seconds per vehicle.

c Level-of-service.

d 50th percentile queue, in feet.

e 95th percentile queue, in feet.

# 95th percentile volume exceeds capacity, queue may be longer.

**Table A-1 Signalized Intersection Capacity Analysis (continued)**

| Location /<br>Movement                                       | 2018 Existing Condition |                  |                  |                   |                   | 2025 No-Build Condition |           |          |      |      | 2025 Build Condition<br>with Robust Shuttle Service |           |          |      |      |
|--------------------------------------------------------------|-------------------------|------------------|------------------|-------------------|-------------------|-------------------------|-----------|----------|------|------|-----------------------------------------------------|-----------|----------|------|------|
|                                                              | v/c <sup>a</sup>        | Del <sup>b</sup> | LOS <sup>c</sup> | 50 Q <sup>d</sup> | 95 Q <sup>e</sup> | v/c                     | Del       | LOS      | 50 Q | 95 Q | v/c                                                 | Del       | LOS      | 50 Q | 95 Q |
| <b>14: Winchester Street at Needham Street/Dedham Street</b> |                         |                  |                  |                   |                   |                         |           |          |      |      |                                                     |           |          |      |      |
| <i>Weekday Morning</i>                                       |                         |                  |                  |                   |                   |                         |           |          |      |      |                                                     |           |          |      |      |
| EB L                                                         | 1.19                    | >120             | F                | ~457              | #676              | 0.75                    | 36        | D        | 206  | 305  | 0.78                                                | 37        | D        | 221  | 326  |
| EB L/T                                                       | 1.18                    | >120             | F                | ~458              | #677              | N/A                     | N/A       | N/A      | N/A  | N/A  | N/A                                                 | N/A       | N/A      | N/A  | N/A  |
| EB T/R                                                       | N/A                     | N/A              | N/A              | N/A               | N/A               | 0.27                    | 24        | C        | 56   | 116  | 0.28                                                | 23        | C        | 57   | 119  |
| EB R                                                         | 0.11                    | 0.6              | A                | 0                 | 0                 | N/A                     | N/A       | N/A      | N/A  | N/A  | N/A                                                 | N/A       | N/A      | N/A  | N/A  |
| WB L/T/R                                                     | 1.12                    | >120             | F                | ~296              | #646              | 1.02                    | 93        | F        | ~177 | #390 | 1.03                                                | 94        | F        | ~177 | #390 |
| NB L/T/R                                                     | 1.07                    | 117              | F                | ~367              | 394               | N/A                     | N/A       | N/A      | N/A  | N/A  | N/A                                                 | N/A       | N/A      | N/A  | N/A  |
| NB L                                                         | N/A                     | N/A              | N/A              | N/A               | N/A               | 0.19                    | 29        | C        | 14   | 44   | 0.19                                                | 29        | C        | 14   | 44   |
| NB T/R                                                       | N/A                     | N/A              | N/A              | N/A               | N/A               | 0.55                    | 32        | C        | 159  | 276  | 0.55                                                | 32        | C        | 159  | 276  |
| SB L/T                                                       | 0.90                    | 79               | E                | 301               | 395               | 0.87                    | 51        | D        | 244  | #452 | 0.88                                                | 53        | D        | 245  | #453 |
| SB R                                                         | 0.42                    | 1                | A                | 0                 | 0                 | 0.72                    | 8         | A        | 114  | 263  | 0.72                                                | 8         | A        | 119  | 274  |
| <b>Total</b>                                                 |                         | <b>93</b>        | <b>F</b>         |                   |                   |                         | <b>35</b> | <b>C</b> |      |      |                                                     | <b>36</b> | <b>D</b> |      |      |
| <i>Weekday Evening</i>                                       |                         |                  |                  |                   |                   |                         |           |          |      |      |                                                     |           |          |      |      |
| EB L                                                         | 0.95                    | 85               | F                | 298               | #498              | 0.78                    | 35        | D        | 226  | 311  | 0.82                                                | 37        | D        | 250  | 339  |
| EB L/T                                                       | 0.96                    | 86               | F                | 307               | #510              | N/A                     | N/A       | N/A      | N/A  | N/A  | N/A                                                 | N/A       | N/A      | N/A  | N/A  |
| EB T/R                                                       | N/A                     | N/A              | N/A              | N/A               | N/A               | 0.32                    | 24        | C        | 72   | 133  | 0.35                                                | 25        | C        | 82   | 148  |
| EB R                                                         | 0.09                    | 0                | A                | 0                 | 0                 | N/A                     | N/A       | N/A      | N/A  | N/A  | N/A                                                 | N/A       | N/A      | N/A  | N/A  |
| WB L/T/R                                                     | >1.20                   | >120             | F                | ~176              | #419              | 0.77                    | 52        | D        | 104  | #207 | 0.80                                                | 55        | E        | 113  | #229 |
| NB L/T/R                                                     | 0.80                    | 53               | D                | 284               | 354               | N/A                     | N/A       | N/A      | N/A  | N/A  | N/A                                                 | N/A       | N/A      | N/A  | N/A  |
| NB L                                                         | N/A                     | N/A              | N/A              | N/A               | N/A               | 0.10                    | 24        | C        | 9    | 28   | 0.16                                                | 26        | C        | 14   | 38   |
| NB T/R                                                       | N/A                     | N/A              | N/A              | N/A               | N/A               | 0.62                    | 32        | C        | 201  | 301  | 0.63                                                | 32        | C        | 202  | 301  |
| SB L/T                                                       | 0.98                    | 84               | F                | 303               | #475              | 1.03                    | 86        | F        | ~270 | #471 | 1.07                                                | 100       | F        | ~277 | #477 |
| SB R                                                         | 0.34                    | 1                | A                | 0                 | 0                 | 0.48                    | 2         | A        | 9    | 45   | 0.54                                                | 3         | A        | 30   | 81   |
| <b>Total</b>                                                 |                         | <b>67</b>        | <b>E</b>         |                   |                   |                         | <b>35</b> | <b>D</b> |      |      |                                                     | <b>37</b> | <b>D</b> |      |      |
| <i>Saturday Midday</i>                                       |                         |                  |                  |                   |                   |                         |           |          |      |      |                                                     |           |          |      |      |
| EB L                                                         | 1.20                    | >120             | F                | ~475              | #696              | 0.76                    | 33        | C        | 204  | #352 | 0.81                                                | 35        | D        | 239  | #435 |
| EB L/T                                                       | 1.20                    | >120             | F                | ~488              | #711              | N/A                     | N/A       | N/A      | N/A  | N/A  | N/A                                                 | N/A       | N/A      | N/A  | N/A  |
| EB T/R                                                       | N/A                     | N/A              | N/A              | N/A               | N/A               | 0.40                    | 24        | C        | 84   | 185  | 0.43                                                | 25        | C        | 98   | 206  |
| EB R                                                         | 0.19                    | 5                | A                | 0                 | 24                | N/A                     | N/A       | N/A      | N/A  | N/A  | N/A                                                 | N/A       | N/A      | N/A  | N/A  |
| WB L/T/R                                                     | 1.12                    | >120             | F                | ~300              | #517              | 0.82                    | 55        | D        | 134  | #337 | 0.89                                                | 66        | E        | 147  | #365 |
| NB L/T/R                                                     | 1.10                    | >120             | F                | ~284              | #396              | N/A                     | N/A       | N/A      | N/A  | N/A  | N/A                                                 | N/A       | N/A      | N/A  | N/A  |
| NB L                                                         | N/A                     | N/A              | N/A              | N/A               | N/A               | 0.20                    | 29        | C        | 19   | 51   | 0.26                                                | 30        | C        | 24   | 62   |
| NB T/R                                                       | N/A                     | N/A              | N/A              | N/A               | N/A               | 0.53                    | 33        | C        | 118  | 212  | 0.53                                                | 33        | C        | 118  | 212  |
| SB L/T                                                       | 0.98                    | 105              | F                | 257               | #350              | 0.78                    | 46        | D        | 147  | 265  | 0.78                                                | 47        | D        | 147  | 266  |
| SB R                                                         | 0.33                    | 1                | A                | 0                 | 0                 | 0.56                    | 5         | A        | 50   | 137  | 0.65                                                | 7         | A        | 87   | 221  |
| <b>Total</b>                                                 |                         | <b>106</b>       | <b>F</b>         |                   |                   |                         | <b>29</b> | <b>C</b> |      |      |                                                     | <b>31</b> | <b>C</b> |      |      |

a Volume to capacity ratio.

b Average total delay, in seconds per vehicle.

c Level-of-service.

d 50th percentile queue, in feet.

e 95th percentile queue, in feet.

~ Volume exceeds capacity, queue is theoretically infinite.

# 95th percentile volume exceeds capacity, queue may be longer.

**Table A-1 Signalized Intersection Capacity Analysis (continued)**

| Location / Movement                                            | 2018 Existing Condition                      |                  |                  |                   |                   | 2025 No-Build Condition |                                                                 |          |       |       | 2025 Build Cond. w/ Robust Shuttle |            |          |       |       |
|----------------------------------------------------------------|----------------------------------------------|------------------|------------------|-------------------|-------------------|-------------------------|-----------------------------------------------------------------|----------|-------|-------|------------------------------------|------------|----------|-------|-------|
|                                                                | v/c <sup>a</sup>                             | Del <sup>b</sup> | LOS <sup>c</sup> | 50 Q <sup>d</sup> | 95 Q <sup>e</sup> | v/c                     | Del                                                             | LOS      | 50 Q  | 95 Q  | v/c                                | Del        | LOS      | 50 Q  | 95 Q  |
| <b>15: Winchester Street at Route 9 Eastbound Service Road</b> |                                              |                  |                  |                   |                   |                         |                                                                 |          |       |       |                                    |            |          |       |       |
| <i>Weekday Morning</i>                                         |                                              |                  |                  |                   |                   |                         |                                                                 |          |       |       |                                    |            |          |       |       |
| EB L                                                           | 0.18                                         | 56               | E                | 53                | 99                | 0.18                    | 56                                                              | E        | 53    | 99    | 0.18                               | 56         | E        | 53    | 99    |
| EB R                                                           | 0.50                                         | 33               | C                | 159               | 257               | 0.51                    | 34                                                              | C        | 163   | 261   | 0.51                               | 34         | C        | 163   | 261   |
| NB T                                                           | 1.10                                         | 97               | F                | ~1258             | #1523             | 1.13                    | 106                                                             | F        | ~1326 | #1592 | 1.13                               | 106        | F        | ~1326 | #1592 |
| NB R                                                           | 0.27                                         | 9                | A                | 53                | 84                | 0.28                    | 9                                                               | A        | 56    | 88    | 0.28                               | 9          | A        | 56    | 88    |
| SB L                                                           | 0.30                                         | 33               | C                | 38                | m32               | 0.30                    | 33                                                              | C        | 38    | m32   | 0.30                               | 33         | C        | 38    | m32   |
| SB T                                                           | 0.94                                         | 59               | E                | 288               | m179              | 0.95                    | 59                                                              | E        | 301   | m178  | 0.95                               | 59         | E        | 301   | m178  |
| <b>Total</b>                                                   |                                              | <b>65</b>        | <b>E</b>         |                   |                   |                         | <b>69</b>                                                       | <b>E</b> |       |       |                                    | <b>69</b>  | <b>E</b> |       |       |
| <i>Weekday Evening</i>                                         |                                              |                  |                  |                   |                   |                         |                                                                 |          |       |       |                                    |            |          |       |       |
| EB L                                                           | 0.16                                         | 51               | D                | 44                | 86                | 0.17                    | 51                                                              | D        | 49    | 93    | 0.17                               | 51         | D        | 49    | 93    |
| EB R                                                           | 0.24                                         | 11               | B                | 25                | 77                | 0.24                    | 12                                                              | B        | 29    | 81    | 0.24                               | 12         | B        | 29    | 81    |
| NB T                                                           | 1.14                                         | 112              | F                | ~1227             | #1491             | 1.20                    | >120                                                            | F        | ~1323 | #1589 | 1.20                               | >120       | F        | ~1323 | #1589 |
| NB R                                                           | 0.40                                         | 11               | B                | 81                | 123               | 0.41                    | 11                                                              | B        | 85    | 129   | 0.41                               | 11         | B        | 85    | 129   |
| SB L                                                           | 0.53                                         | 51               | D                | 93                | m77               | 0.53                    | 51                                                              | D        | 94    | m69   | 0.53                               | 51         | D        | 94    | m69   |
| SB T                                                           | 0.79                                         | 57               | E                | 150               | m128              | 0.85                    | 59                                                              | E        | 167   | m136  | 0.85                               | 59         | E        | 167   | m136  |
| <b>Total</b>                                                   |                                              | <b>70</b>        | <b>E</b>         |                   |                   |                         | <b>80</b>                                                       | <b>E</b> |       |       |                                    | <b>80</b>  | <b>E</b> |       |       |
| <i>Saturday Midday</i>                                         |                                              |                  |                  |                   |                   |                         |                                                                 |          |       |       |                                    |            |          |       |       |
| EB L                                                           | 0.33                                         | 59               | E                | 99                | 162               | 0.34                    | 60                                                              | E        | 104   | 169   | 0.34                               | 60         | E        | 104   | 169   |
| EB R                                                           | 0.33                                         | 10               | A                | 23                | 88                | 0.33                    | 13                                                              | B        | 41    | 110   | 0.33                               | 13         | B        | 41    | 110   |
| NB T                                                           | 0.83                                         | 42               | D                | 701               | 905               | 0.90                    | 57                                                              | E        | 823   | #1123 | 0.90                               | 57         | E        | 823   | #1123 |
| NB R                                                           | 0.39                                         | 9                | A                | 80                | 123               | 0.41                    | 10                                                              | A        | 88    | 133   | 0.41                               | 10         | A        | 88    | 133   |
| SB L                                                           | 0.63                                         | 54               | D                | 119               | m132              | 0.63                    | 52                                                              | D        | 118   | m119  | 0.63                               | 52         | D        | 118   | m119  |
| SB T                                                           | 0.60                                         | 21               | C                | 196               | m210              | 0.67                    | 47                                                              | D        | 219   | m217  | 0.67                               | 47         | D        | 219   | m217  |
| <b>Total</b>                                                   |                                              | <b>29</b>        | <b>C</b>         |                   |                   |                         | <b>43</b>                                                       | <b>D</b> |       |       |                                    | <b>43</b>  | <b>D</b> |       |       |
| <b>16: Winchester Street at Route 9 Westbound Service Road</b> |                                              |                  |                  |                   |                   |                         |                                                                 |          |       |       |                                    |            |          |       |       |
| <i>Weekday Morning</i>                                         |                                              |                  |                  |                   |                   |                         |                                                                 |          |       |       |                                    |            |          |       |       |
| EB L/T/R                                                       | 0.09                                         | 1                | A                | 0                 | 0                 | 0.09                    | 1                                                               | A        | 0     | 0     | 0.09                               | 1          | A        | 0     | 0     |
| WB L                                                           | 1.16                                         | >120             | F                | ~244              | #416              | 1.16                    | >120                                                            | F        | ~244  | #416  | 1.16                               | >120       | F        | ~244  | #416  |
| WB T/R                                                         | 0.06                                         | 0                | A                | 0                 | 0                 | 0.06                    | 0                                                               | A        | 0     | 0     | 0.06                               | 0          | A        | 0     | 0     |
| NB L                                                           | 1.05                                         | 103              | F                | ~232              | m#236             | 1.05                    | 100                                                             | F        | ~233  | m#223 | 1.05                               | 100        | F        | ~233  | m#223 |
| NB T                                                           | 0.83                                         | 35               | D                | 193               | m200              | 0.85                    | 46                                                              | D        | 197   | m199  | 0.85                               | 46         | D        | 197   | m199  |
| SB L/T/R                                                       | >1.20                                        | >120             | F                | ~1640             | #1908             | >1.20                   | >120                                                            | F        | ~1664 | #1931 | >1.20                              | >120       | F        | ~1664 | #1931 |
| <b>Total</b>                                                   |                                              | <b>110</b>       | <b>F</b>         |                   |                   |                         | <b>116</b>                                                      | <b>F</b> |       |       |                                    | <b>116</b> | <b>F</b> |       |       |
| <i>Weekday Evening</i>                                         |                                              |                  |                  |                   |                   |                         |                                                                 |          |       |       |                                    |            |          |       |       |
| EB L/T/R                                                       | 0.12                                         | 1                | A                | 0                 | 0                 | 0.11                    | 1                                                               | A        | 0     | 0     | 0.11                               | 1          | A        | 0     | 0     |
| WB L                                                           | 0.87                                         | 118              | F                | 145               | #267              | 0.93                    | >120                                                            | F        | 162   | #305  | 0.93                               | >120       | F        | 162   | #305  |
| WB T/R                                                         | 0.09                                         | 0                | A                | 0                 | 0                 | 0.08                    | 0                                                               | A        | 0     | 0     | 0.08                               | 0          | A        | 0     | 0     |
| NB L                                                           | 0.62                                         | 61               | E                | 118               | m110              | 0.65                    | 64                                                              | E        | 124   | m107  | 0.65                               | 64         | E        | 124   | m107  |
| NB T                                                           | 0.78                                         | 28               | C                | 56                | m70               | 0.81                    | 48                                                              | D        | 103   | m68   | 0.81                               | 48         | D        | 103   | m68   |
| SB L/T/R                                                       | >1.20                                        | >120             | F                | ~1376             | #1642             | >1.20                   | >120                                                            | F        | ~1494 | #1761 | >1.20                              | >120       | F        | ~1494 | #1761 |
| <b>Total</b>                                                   |                                              | <b>90</b>        | <b>F</b>         |                   |                   |                         | <b>114</b>                                                      | <b>F</b> |       |       |                                    | <b>114</b> | <b>F</b> |       |       |
| <i>Saturday Midday</i>                                         |                                              |                  |                  |                   |                   |                         |                                                                 |          |       |       |                                    |            |          |       |       |
| EB L/T/R                                                       | 0.12                                         | 1                | A                | 0                 | 0                 | 0.12                    | 1                                                               | A        | 0     | 0     | 0.12                               | 1          | A        | 0     | 0     |
| WB L                                                           | 0.99                                         | >120             | F                | 205               | #377              | 1.10                    | >120                                                            | F        | ~253  | #431  | 1.10                               | >120       | F        | ~253  | #431  |
| WB T/R                                                         | 0.10                                         | 1                | A                | 0                 | 0                 | 0.10                    | 1                                                               | A        | 0     | 0     | 0.10                               | 1          | A        | 0     | 0     |
| NB L                                                           | 0.88                                         | 90               | F                | 179               | m#258             | 0.90                    | 89                                                              | F        | 185   | m#234 | 0.90                               | 89         | F        | 185   | m#234 |
| NB T                                                           | 0.60                                         | 5                | A                | 66                | 113               | 0.65                    | 6                                                               | A        | 81    | m122  | 0.65                               | 6          | A        | 81    | m122  |
| SB L/T/R                                                       | 0.92                                         | 97               | F                | 829               | #1135             | 1.00                    | 102                                                             | F        | 977   | #1298 | 1.00                               | 102        | F        | 977   | #1298 |
| <b>Total</b>                                                   |                                              | <b>64</b>        | <b>E</b>         |                   |                   |                         | <b>66</b>                                                       | <b>E</b> |       |       |                                    | <b>66</b>  | <b>E</b> |       |       |
| a                                                              | Volume to capacity ratio.                    |                  |                  |                   |                   | e                       | 95th percentile queue, in feet.                                 |          |       |       |                                    |            |          |       |       |
| b                                                              | Average total delay, in seconds per vehicle. |                  |                  |                   |                   | ~                       | Volume exceeds capacity, queue is theoretically infinite.       |          |       |       |                                    |            |          |       |       |
| c                                                              | Level-of-service.                            |                  |                  |                   |                   | #                       | 95th percentile vol. exceeds capacity, queue may be longer.     |          |       |       |                                    |            |          |       |       |
| d                                                              | 50th percentile queue, in feet.              |                  |                  |                   |                   | m                       | Volume for 95th percentile queue is metered by upstream signal. |          |       |       |                                    |            |          |       |       |

**Table A-1 Signalized Intersection Capacity Analysis (continued)**

| Location /<br>Movement                          | 2018 Existing Condition |                  |                  |                   |                   | 2025 No-Build Condition |           |          |      |      | 2025 Build Condition<br>with Robust Shuttle Service |           |          |      |      |
|-------------------------------------------------|-------------------------|------------------|------------------|-------------------|-------------------|-------------------------|-----------|----------|------|------|-----------------------------------------------------|-----------|----------|------|------|
|                                                 | v/c <sup>a</sup>        | Del <sup>b</sup> | LOS <sup>c</sup> | 50 Q <sup>d</sup> | 95 Q <sup>e</sup> | v/c                     | Del       | LOS      | 50 Q | 95 Q | v/c                                                 | Del       | LOS      | 50 Q | 95 Q |
| <b>17: Centre Street at Walnut Street</b>       |                         |                  |                  |                   |                   |                         |           |          |      |      |                                                     |           |          |      |      |
| <i>Weekday Morning</i>                          |                         |                  |                  |                   |                   |                         |           |          |      |      |                                                     |           |          |      |      |
| SEB L/T                                         | 0.15                    | 45               | D                | 14                | 38                | 0.16                    | 45        | D        | 14   | 40   | 0.16                                                | 45        | D        | 14   | 40   |
| SEB R                                           | 0.67                    | 36               | D                | 189               | 285               | 0.84                    | 47        | D        | 256  | #450 | 0.86                                                | 49        | D        | 261  | #460 |
| NWB L/T/R                                       | 0.48                    | 53               | D                | 54                | 103               | 0.47                    | 53        | D        | 52   | 101  | 0.47                                                | 53        | D        | 52   | 101  |
| NEB L                                           | 0.65                    | 16               | B                | 107               | 209               | 0.81                    | 33        | C        | 170  | #374 | 0.84                                                | 35        | D        | 180  | #395 |
| NEB T/R                                         | 0.52                    | 12               | B                | 232               | 370               | 0.59                    | 15        | B        | 279  | 448  | 0.60                                                | 15        | B        | 293  | 471  |
| SWB L/T/R                                       | 0.82                    | 38               | D                | 396               | #655              | 1.04                    | 72        | E        | ~627 | #915 | 1.04                                                | 74        | E        | ~634 | #924 |
| <b>Total</b>                                    |                         | <b>26</b>        | <b>C</b>         |                   |                   |                         | <b>44</b> | <b>D</b> |      |      |                                                     | <b>45</b> | <b>D</b> |      |      |
| <i>Weekday Evening</i>                          |                         |                  |                  |                   |                   |                         |           |          |      |      |                                                     |           |          |      |      |
| SEB L/T                                         | 0.24                    | 47               | D                | 12                | 53                | 0.25                    | 48        | D        | 22   | 54   | 0.25                                                | 48        | D        | 22   | 54   |
| SEB R                                           | 0.80                    | 44               | D                | 233               | #396              | 0.93                    | 59        | E        | ~294 | #510 | 0.97                                                | 68        | E        | ~335 | #546 |
| NWB L/T/R                                       | 0.40                    | 50               | D                | 45                | 89                | 0.40                    | 50        | D        | 45   | 89   | 0.40                                                | 50        | D        | 45   | 89   |
| NEB L                                           | 0.62                    | 15               | B                | 99                | 186               | 0.82                    | 29        | C        | 166  | #371 | 0.87                                                | 36        | D        | 191  | #414 |
| NEB T/R                                         | 0.38                    | 9                | A                | 145               | 230               | 0.51                    | 12        | B        | 219  | 343  | 0.53                                                | 12        | B        | 234  | 365  |
| SWB L/T/R                                       | 0.84                    | 39               | D                | 401               | #662              | 0.93                    | 49        | D        | ~482 | #770 | 0.98                                                | 59        | E        | ~558 | #828 |
| <b>Total</b>                                    |                         | <b>29</b>        | <b>C</b>         |                   |                   |                         | <b>37</b> | <b>D</b> |      |      |                                                     | <b>43</b> | <b>D</b> |      |      |
| <i>Saturday MIDDAY</i>                          |                         |                  |                  |                   |                   |                         |           |          |      |      |                                                     |           |          |      |      |
| SEB L/T                                         | 0.31                    | 47               | D                | 21                | 63                | 0.33                    | 47        | D        | 22   | 64   | 0.33                                                | 47        | D        | 22   | 64   |
| SEB R                                           | 0.62                    | 31               | C                | 130               | 281               | 0.72                    | 35        | D        | 156  | #352 | 0.77                                                | 38        | D        | 170  | #412 |
| NWB L/T/R                                       | 0.70                    | 60               | E                | 76                | #180              | 0.71                    | 61        | E        | 80   | #192 | 0.71                                                | 61        | E        | 80   | #192 |
| NEB L                                           | 0.68                    | 15               | B                | 68                | 210               | 0.72                    | 17        | B        | 73   | #293 | 0.79                                                | 22        | C        | 79   | #369 |
| NEB T/R                                         | 0.26                    | 8                | A                | 45                | 147               | 0.29                    | 8         | A        | 55   | 178  | 0.32                                                | 9         | A        | 63   | 203  |
| SWB L/T/R                                       | 0.63                    | 27               | C                | 195               | 374               | 0.67                    | 29        | C        | 215  | 459  | 0.73                                                | 31        | C        | 245  | #560 |
| <b>Total</b>                                    |                         | <b>24</b>        | <b>C</b>         |                   |                   |                         | <b>26</b> | <b>C</b> |      |      |                                                     | <b>29</b> | <b>C</b> |      |      |
| <b>18: Nahanton Street at Winchester Street</b> |                         |                  |                  |                   |                   |                         |           |          |      |      |                                                     |           |          |      |      |
| <i>Weekday Morning</i>                          |                         |                  |                  |                   |                   |                         |           |          |      |      |                                                     |           |          |      |      |
| EB L                                            | 0.50                    | 8                | A                | 52                | 51                | 0.63                    | 12        | B        | 57   | 90   | 0.63                                                | 13        | B        | 57   | 94   |
| EB T                                            | 0.37                    | 6                | A                | 127               | 116               | 0.40                    | 5         | A        | 143  | 115  | 0.40                                                | 5         | A        | 142  | 115  |
| WB T/R                                          | 0.59                    | 18               | B                | 295               | 450               | 0.72                    | 22        | C        | 395  | 586  | 0.73                                                | 22        | C        | 399  | 594  |
| SB L                                            | 0.07                    | 42               | D                | 13                | 41                | 0.12                    | 46        | D        | 21   | 55   | 0.16                                                | 47        | D        | 27   | 67   |
| SB R                                            | 0.60                    | 39               | D                | 183               | 262               | 0.73                    | 44        | D        | 247  | 352  | 0.74                                                | 44        | D        | 248  | 352  |
| <b>Total</b>                                    |                         | <b>17</b>        | <b>B</b>         |                   |                   |                         | <b>20</b> | <b>C</b> |      |      |                                                     | <b>21</b> | <b>C</b> |      |      |
| <i>Weekday Evening</i>                          |                         |                  |                  |                   |                   |                         |           |          |      |      |                                                     |           |          |      |      |
| EB L/T/R                                        | 0.56                    | 10               | A                | 86                | 149               | 0.73                    | 14        | B        | 115  | 138  | 0.76                                                | 16        | B        | 117  | 142  |
| WB T/R                                          | 0.44                    | 9                | A                | 172               | 282               | 0.51                    | 9         | A        | 226  | 264  | 0.51                                                | 9         | A        | 228  | 247  |
| WB L                                            | 0.43                    | 19               | B                | 194               | 347               | 0.53                    | 21        | C        | 273  | 380  | 0.56                                                | 22        | C        | 289  | 390  |
| NB L/T/R                                        | 0.13                    | 38               | D                | 29                | 59                | 0.20                    | 41        | D        | 45   | 91   | 0.24                                                | 42        | D        | 56   | 110  |
| NB L/T                                          | 0.57                    | 34               | C                | 204               | 249               | 0.62                    | 35        | C        | 225  | 327  | 0.62                                                | 35        | C        | 227  | 338  |
| <b>Total</b>                                    |                         | <b>18</b>        | <b>B</b>         |                   |                   |                         | <b>19</b> | <b>B</b> |      |      |                                                     | <b>20</b> | <b>B</b> |      |      |
| <i>Saturday MIDDAY</i>                          |                         |                  |                  |                   |                   |                         |           |          |      |      |                                                     |           |          |      |      |
| EB L/T/R                                        | 0.48                    | 8                | A                | 43                | 77                | 0.59                    | 10        | B        | 52   | 79   | 0.63                                                | 12        | B        | 54   | 79   |
| WB T/R                                          | 0.33                    | 6                | A                | 83                | 137               | 0.38                    | 7         | A        | 103  | 149  | 0.38                                                | 7         | A        | 105  | 145  |
| WB L                                            | 0.55                    | 17               | B                | 190               | 316               | 0.62                    | 19        | B        | 228  | 346  | 0.65                                                | 20        | C        | 247  | 363  |
| NB L/T                                          | 0.21                    | 30               | C                | 35                | 67                | 0.23                    | 31        | C        | 38   | 78   | 0.31                                                | 32        | C        | 51   | 100  |
| SB R                                            | 0.56                    | 26               | C                | 141               | 192               | 0.55                    | 26        | C        | 137  | 216  | 0.55                                                | 26        | C        | 137  | 222  |
| <b>Total</b>                                    |                         | <b>15</b>        | <b>B</b>         |                   |                   |                         | <b>16</b> | <b>B</b> |      |      |                                                     | <b>17</b> | <b>B</b> |      |      |

a Volume to capacity ratio.

b Average total delay, in seconds per vehicle.

c Level-of-service.

d 50th percentile queue, in feet.

e 95th percentile queue, in feet.

~ Volume exceeds capacity, queue is theoretically infinite.

# 95th percentile volume exceeds capacity, queue may be longer.

**Table A-1 Signalized Intersection Capacity Analysis (continued)**

| Location / Movement                                   | 2018 Existing Condition |                  |                  |                   |                   | 2025 No-Build Condition |           |          |      |      | 2025 Build Condition with Robust Shuttle Service |           |          |      |      |
|-------------------------------------------------------|-------------------------|------------------|------------------|-------------------|-------------------|-------------------------|-----------|----------|------|------|--------------------------------------------------|-----------|----------|------|------|
|                                                       | v/c <sup>a</sup>        | Del <sup>b</sup> | LOS <sup>c</sup> | 50 Q <sup>d</sup> | 95 Q <sup>e</sup> | v/c                     | Del       | LOS      | 50 Q | 95 Q | v/c                                              | Del       | LOS      | 50 Q | 95 Q |
| <b>19: Nahant Street at Wells Avenue/JCC Driveway</b> |                         |                  |                  |                   |                   |                         |           |          |      |      |                                                  |           |          |      |      |
| <i>Weekday Morning</i>                                |                         |                  |                  |                   |                   |                         |           |          |      |      |                                                  |           |          |      |      |
| EB L                                                  | 0.15                    | 4                | A                | 6                 | 19                | 0.16                    | 4         | A        | 8    | 19   | 0.16                                             | 4         | A        | 8    | 19   |
| EB T                                                  | 0.58                    | 14               | B                | 145               | 287               | 0.64                    | 17        | B        | 215  | 349  | 0.64                                             | 17        | B        | 215  | 349  |
| EB R                                                  | 0.29                    | 3                | A                | 4                 | 39                | 0.40                    | 4         | A        | 17   | 61   | 0.40                                             | 4         | A        | 17   | 61   |
| WB L                                                  | 0.49                    | 7                | A                | 28                | 63                | 0.79                    | 19        | B        | 57   | #133 | 0.79                                             | 19        | B        | 57   | #133 |
| WB T/R                                                | 0.71                    | 17               | B                | 183               | 371               | 0.75                    | 19        | B        | 259  | 428  | 0.75                                             | 19        | B        | 259  | 428  |
| NB L                                                  | 0.52                    | 42               | D                | 40                | 101               | 0.63                    | 50        | D        | 64   | 121  | 0.63                                             | 50        | D        | 64   | 121  |
| NB T/R                                                | 0.44                    | 13               | B                | 6                 | 60                | 0.47                    | 13        | B        | 8    | 63   | 0.47                                             | 13        | B        | 8    | 63   |
| SB L                                                  | 0.43                    | 40               | D                | 29                | 78                | 0.48                    | 46        | D        | 37   | 80   | 0.48                                             | 46        | D        | 37   | 80   |
| SB T/R                                                | 0.23                    | 14               | B                | 4                 | 40                | 0.23                    | 15        | B        | 5    | 40   | 0.23                                             | 15        | B        | 5    | 40   |
| <b>Total</b>                                          |                         | <b>14</b>        | <b>B</b>         |                   |                   |                         | <b>17</b> | <b>B</b> |      |      |                                                  | <b>17</b> | <b>B</b> |      |      |
| <i>Weekday Evening</i>                                |                         |                  |                  |                   |                   |                         |           |          |      |      |                                                  |           |          |      |      |
| EB L                                                  | 0.18                    | 14               | B                | 13                | 33                | 0.19                    | 15        | B        | 15   | 34   | 0.19                                             | 15        | B        | 15   | 34   |
| EB T                                                  | 0.73                    | 34               | C                | 244               | #430              | 0.93                    | 55        | D        | 330  | #541 | 0.94                                             | 56        | E        | 335  | #548 |
| EB R                                                  | 0.18                    | 10               | B                | 13                | 52                | 0.24                    | 12        | B        | 23   | 67   | 0.24                                             | 12        | B        | 23   | 67   |
| WB L                                                  | 0.44                    | 17               | B                | 44                | 85                | 0.70                    | 32        | C        | 61   | #138 | 0.70                                             | 32        | C        | 61   | #138 |
| WB T/R                                                | 0.92                    | 50               | D                | 336               | #606              | 1.14                    | 113       | F        | ~501 | #722 | 1.15                                             | 116       | F        | ~506 | #727 |
| NB L                                                  | 0.88                    | 44               | D                | 222               | #396              | 0.97                    | 59        | E        | 313  | #534 | 0.97                                             | 59        | E        | 313  | #534 |
| NB T/R                                                | 0.44                    | 4                | A                | 7                 | 60                | 0.51                    | 7         | A        | 39   | 115  | 0.51                                             | 7         | A        | 39   | 116  |
| SB L                                                  | 0.41                    | 24               | C                | 44                | 93                | 0.47                    | 27        | C        | 52   | 109  | 0.47                                             | 27        | C        | 52   | 109  |
| SB T/R                                                | 0.10                    | 5                | A                | 1                 | 24                | 0.09                    | 5         | A        | 1    | 24   | 0.09                                             | 5         | A        | 1    | 24   |
| <b>Total</b>                                          |                         | <b>32</b>        | <b>C</b>         |                   |                   |                         | <b>56</b> | <b>E</b> |      |      |                                                  | <b>57</b> | <b>E</b> |      |      |
| <i>Saturday Midday</i>                                |                         |                  |                  |                   |                   |                         |           |          |      |      |                                                  |           |          |      |      |
| EB L                                                  | 0.05                    | 4                | A                | 3                 | 8                 | 0.05                    | 4         | A        | 3    | 8    | 0.06                                             | 4         | A        | 3    | 8    |
| EB T                                                  | 0.63                    | 17               | B                | 158               | 249               | 0.66                    | 17        | B        | 191  | 302  | 0.66                                             | 17        | B        | 193  | 305  |
| EB R                                                  | 0.16                    | 3                | A                | 1                 | 23                | 0.18                    | 3         | A        | 5    | 30   | 0.18                                             | 3         | A        | 5    | 30   |
| WB L                                                  | 0.37                    | 7                | A                | 12                | 41                | 0.47                    | 8         | A        | 29   | 49   | 0.47                                             | 8         | A        | 29   | 49   |
| WB T/R                                                | 0.68                    | 18               | B                | 173               | 274               | 0.72                    | 19        | B        | 216  | 342  | 0.72                                             | 19        | B        | 219  | 347  |
| NB L                                                  | 0.74                    | 45               | D                | 88                | #246              | 0.80                    | 55        | D        | 102  | #280 | 0.81                                             | 55        | D        | 103  | #280 |
| NB T/R                                                | 0.32                    | 8                | A                | 2                 | 44                | 0.34                    | 9         | A        | 2    | 54   | 0.34                                             | 9         | A        | 2    | 54   |
| SB L                                                  | 0.14                    | 28               | C                | 13                | 49                | 0.17                    | 31        | C        | 16   | 52   | 0.17                                             | 31        | C        | 16   | 52   |
| SB T/R                                                | 0.10                    | 12               | B                | 1                 | 27                | 0.11                    | 12        | B        | 1    | 28   | 0.11                                             | 12        | B        | 1    | 28   |
| <b>Total</b>                                          |                         | <b>18</b>        | <b>B</b>         |                   |                   |                         | <b>19</b> | <b>B</b> |      |      |                                                  | <b>20</b> | <b>B</b> |      |      |

- a Volume to capacity ratio.  
b Average total delay, in seconds per vehicle.  
c Level-of-service.  
d 50th percentile queue, in feet.  
e 95th percentile queue, in feet.  
~ Volume exceeds capacity, queue is theoretically infinite.  
# 95th percentile volume exceeds capacity, queue may be longer.



**Table A-1 Signalized Intersection Capacity Analysis (continued)**

| Location /<br>Movement                                               | 2018 Existing Condition |                  |                  |                   |                   | 2025 No-Build Condition |           |          |      |      | 2025 Build Condition<br>with Robust Shuttle Service |           |          |      |      |
|----------------------------------------------------------------------|-------------------------|------------------|------------------|-------------------|-------------------|-------------------------|-----------|----------|------|------|-----------------------------------------------------|-----------|----------|------|------|
|                                                                      | v/c <sup>a</sup>        | Del <sup>b</sup> | LOS <sup>c</sup> | 50 Q <sup>d</sup> | 95 Q <sup>e</sup> | v/c                     | Del       | LOS      | 50 Q | 95 Q | v/c                                                 | Del       | LOS      | 50 Q | 95 Q |
| <b>22: Highland Avenue at 2<sup>nd</sup> Avenue/Staples Driveway</b> |                         |                  |                  |                   |                   |                         |           |          |      |      |                                                     |           |          |      |      |
| <i>Weekday Morning</i>                                               |                         |                  |                  |                   |                   |                         |           |          |      |      |                                                     |           |          |      |      |
| EB L                                                                 | N/A                     | N/A              | N/A              | N/A               | N/A               | 0.02                    | 13        | B        | 1    | 10   | 0.02                                                | 13        | B        | 1    | 10   |
| EB L/T/R                                                             | 0.54                    | 14               | B                | 171               | 155               | N/A                     | N/A       | N/A      | N/A  | N/A  | N/A                                                 | N/A       | N/A      | N/A  | N/A  |
| EB T/R                                                               | N/A                     | N/A              | N/A              | N/A               | N/A               | 0.58                    | 14        | B        | 158  | 442  | 0.57                                                | 14        | B        | 160  | 445  |
| WB L/T/R                                                             | 1.18dl                  | 27               | C                | 222               | 231               | >1.20dl                 | 40        | D        | 218  | #635 | >1.20dl                                             | 54        | D        | 254  | #692 |
| NB L                                                                 | 0.66                    | 50               | D                | 107               | #280              | 0.39                    | 40        | D        | 47   | 128  | 0.40                                                | 41        | D        | 51   | 128  |
| NB L/T                                                               | 0.67                    | 50               | D                | 108               | #284              | 0.38                    | 40        | D        | 47   | 126  | 0.39                                                | 41        | D        | 51   | 126  |
| NB R                                                                 | 0.35                    | 5                | A                | 0                 | 28                | 0.48                    | 11        | B        | 0    | 63   | 0.48                                                | 11        | B        | 0    | 63   |
| SB L/T                                                               | 0.51                    | 69               | E                | 20                | #72               | 0.18                    | 39        | D        | 15   | 49   | 0.18                                                | 39        | D        | 16   | 49   |
| SB R                                                                 | 0.00                    | 0                | A                | 0                 | 0                 | 0.00                    | 0         | A        | 0    | 0    | 0.00                                                | 0         | A        | 0    | 0    |
| <b>Total</b>                                                         |                         | <b>25</b>        | <b>C</b>         |                   |                   |                         | <b>27</b> | <b>C</b> |      |      |                                                     | <b>32</b> | <b>C</b> |      |      |
| <i>Weekday Evening</i>                                               |                         |                  |                  |                   |                   |                         |           |          |      |      |                                                     |           |          |      |      |
| EB L                                                                 | N/A                     | N/A              | N/A              | N/A               | N/A               | 0.07                    | 18        | B        | 3    | 19   | 0.07                                                | 19        | B        | 3    | 19   |
| EB L/T/R                                                             | 0.41                    | 14               | B                | 136               | 165               | N/A                     | N/A       | N/A      | N/A  | N/A  | N/A                                                 | N/A       | N/A      | N/A  | N/A  |
| EB T/R                                                               | N/A                     | N/A              | N/A              | N/A               | N/A               | 0.42                    | 16        | B        | 132  | 323  | 0.46                                                | 16        | B        | 150  | 362  |
| WB L/T/R                                                             | 0.79                    | 24               | C                | 267               | 321               | 0.96                    | 41        | D        | 328  | #798 | 1.03                                                | 58        | E        | ~414 | #855 |
| NB L                                                                 | >1.20                   | >120             | F                | ~436              | #602              | 0.67                    | 49        | D        | 112  | 231  | 0.67                                                | 49        | D        | 112  | 231  |
| NB L/T                                                               | >1.20                   | >120             | F                | ~446              | #612              | 0.66                    | 48        | D        | 112  | 230  | 0.66                                                | 48        | D        | 112  | 230  |
| NB R                                                                 | 0.40                    | 9                | A                | 0                 | 46                | 0.46                    | 9         | A        | 0    | 63   | 0.46                                                | 9         | A        | 0    | 63   |
| SB L/T                                                               | >1.20                   | >120             | F                | ~135              | #193              | 0.45                    | 49        | D        | 48   | 112  | 0.45                                                | 49        | D        | 48   | 112  |
| SB R                                                                 | 0.11                    | 1                | A                | 0                 | 0                 | 0.08                    | 0         | A        | 0    | 0    | 0.08                                                | 0         | A        | 0    | 0    |
| <b>Total</b>                                                         |                         | <b>118</b>       | <b>F</b>         |                   |                   |                         | <b>32</b> | <b>C</b> |      |      |                                                     | <b>39</b> | <b>D</b> |      |      |
| <i>Saturday Midday</i>                                               |                         |                  |                  |                   |                   |                         |           |          |      |      |                                                     |           |          |      |      |
| EB L                                                                 | N/A                     | N/A              | N/A              | N/A               | N/A               | 0.08                    | 12        | B        | 3    | 18   | 0.09                                                | 12        | B        | 3    | 18   |
| EB L/T/R                                                             | 0.40                    | 14               | B                | 117               | 105               | N/A                     | N/A       | N/A      | N/A  | N/A  | N/A                                                 | N/A       | N/A      | N/A  | N/A  |
| EB T/R                                                               | N/A                     | N/A              | N/A              | N/A               | N/A               | 0.42                    | 11        | B        | 115  | 232  | 0.46                                                | 12        | B        | 135  | 267  |
| WB L/T/R                                                             | 0.74                    | 21               | C                | 225               | 202               | 0.84                    | 24        | C        | 241  | #540 | 0.94                                                | 34        | C        | 298  | #625 |
| NB L                                                                 | 0.65                    | 51               | D                | 91                | #212              | 0.37                    | 40        | D        | 44   | 95   | 0.37                                                | 40        | D        | 44   | 95   |
| NB L/T                                                               | 0.64                    | 50               | D                | 90                | #210              | 0.36                    | 40        | D        | 44   | 95   | 0.36                                                | 40        | D        | 44   | 95   |
| NB R                                                                 | 0.40                    | 6                | A                | 0                 | 25                | 0.52                    | 11        | B        | 0    | 58   | 0.51                                                | 11        | B        | 0    | 58   |
| SB L/T                                                               | 1.05                    | >120             | F                | ~52               | #169              | 0.49                    | 49        | D        | 44   | 103  | 0.49                                                | 49        | C        | 44   | 103  |
| SB R                                                                 | 0.04                    | 0                | A                | 0                 | 0                 | 0.05                    | 0         | A        | 0    | 0    | 0.05                                                | 0         | A        | 0    | 0    |
| <b>Total</b>                                                         |                         | <b>27</b>        | <b>C</b>         |                   |                   |                         | <b>20</b> | <b>C</b> |      |      |                                                     | <b>25</b> | <b>C</b> |      |      |

- a Volume to capacity ratio.  
b Average total delay, in seconds per vehicle.  
c Level-of-service.  
d 50th percentile queue, in feet.  
e 95th percentile queue, in feet.  
~ Volume exceeds capacity, queue is theoretically infinite.  
# 95th percentile volume exceeds capacity, queue may be longer.  
dl Defacto Left Lane

**Table A-1 Signalized Intersection Capacity Analysis (continued)**

| Location /<br>Movement                                                                | 2018 Existing Condition |                  |                  |                   |                   | 2025 No-Build Condition |     |          |      |      | 2025 Build Condition<br>with Robust Shuttle Service |     |          |      |      |
|---------------------------------------------------------------------------------------|-------------------------|------------------|------------------|-------------------|-------------------|-------------------------|-----|----------|------|------|-----------------------------------------------------|-----|----------|------|------|
|                                                                                       | v/c <sup>a</sup>        | Del <sup>b</sup> | LOS <sup>c</sup> | 50 Q <sup>d</sup> | 95 Q <sup>e</sup> | v/c                     | Del | LOS      | 50 Q | 95 Q | v/c                                                 | Del | LOS      | 50 Q | 95 Q |
| <b>25: Highland Avenue at 1<sup>st</sup> Avenue/Riverside Community Care Driveway</b> |                         |                  |                  |                   |                   |                         |     |          |      |      |                                                     |     |          |      |      |
| <i>Weekday Morning</i>                                                                |                         |                  |                  |                   |                   |                         |     |          |      |      |                                                     |     |          |      |      |
| EB T                                                                                  |                         |                  |                  |                   |                   | 0.74                    | 19  | B        | 145  | 511  | 0.75                                                | 19  | B        | 145  | 513  |
| EB R                                                                                  |                         |                  |                  |                   |                   | 0.52                    | 2   | A        | 0    | 33   | 0.52                                                | 2   | A        | 0    | 33   |
| WB T/R                                                                                |                         |                  |                  |                   |                   | 0.55                    | 15  | B        | 86   | 300  | 0.59                                                | 16  | B        | 96   | 330  |
| NB L                                                                                  |                         |                  |                  |                   |                   | 0.46                    | 33  | C        | 48   | 209  | 0.47                                                | 33  | C        | 48   | 209  |
| NB R                                                                                  |                         |                  |                  |                   |                   | 0.39                    | 18  | B        | 18   | 124  | 0.39                                                | 18  | B        | 18   | 124  |
| SB R                                                                                  |                         |                  |                  |                   |                   | 0.05                    | 0   | A        | 0    | 0    | 0.05                                                | 0   | A        | 0    | 0    |
| <b>Total</b>                                                                          |                         |                  |                  |                   |                   | <b>15</b>               |     | <b>B</b> |      |      | <b>15</b>                                           |     | <b>B</b> |      |      |
| <i>Weekday Evening</i>                                                                |                         |                  |                  |                   |                   |                         |     |          |      |      |                                                     |     |          |      |      |
| EB T                                                                                  |                         |                  |                  |                   |                   | 0.49                    | 16  | B        | 127  | 348  | 0.52                                                | 17  | B        | 142  | 386  |
| EB R                                                                                  |                         |                  |                  |                   |                   | 0.17                    | 1   | A        | 0    | 22   | 0.17                                                | 1   | A        | 0    | 22   |
| WB T/R                                                                                |                         |                  |                  |                   |                   | 0.87                    | 26  | C        | 303  | #819 | 0.89                                                | 27  | C        | 321  | #854 |
| NB L                                                                                  |                         |                  |                  |                   |                   | 0.76                    | 44  | D        | 138  | #383 | 0.76                                                | 45  | D        | 138  | #398 |
| NB R                                                                                  |                         |                  |                  |                   |                   | 0.65                    | 28  | C        | 87   | #250 | 0.65                                                | 28  | C        | 87   | #265 |
| SB R                                                                                  |                         |                  |                  |                   |                   | 0.08                    | 1   | A        | 0    | 0    | 0.08                                                | 1   | A        | 0    | 0    |
| <b>Total</b>                                                                          |                         |                  |                  |                   |                   | <b>24</b>               |     | <b>C</b> |      |      | <b>24</b>                                           |     | <b>C</b> |      |      |
| <i>Saturday Midday</i>                                                                |                         |                  |                  |                   |                   |                         |     |          |      |      |                                                     |     |          |      |      |
| EB T                                                                                  |                         |                  |                  |                   |                   | 0.44                    | 8   | A        | 64   | 137  | 0.46                                                | 8   | A        | 75   | 156  |
| EB R                                                                                  |                         |                  |                  |                   |                   | 0.12                    | 0   | A        | 0    | 3    | 0.11                                                | 0   | A        | 0    | 3    |
| WB T/R                                                                                |                         |                  |                  |                   |                   | 0.68                    | 10  | B        | 122  | 225  | 0.69                                                | 10  | B        | 139  | 249  |
| NB L                                                                                  |                         |                  |                  |                   |                   | 0.43                    | 22  | C        | 42   | 112  | 0.46                                                | 25  | C        | 47   | 121  |
| NB R                                                                                  |                         |                  |                  |                   |                   | 0.35                    | 11  | B        | 13   | 64   | 0.37                                                | 12  | B        | 15   | 68   |
| SB R                                                                                  |                         |                  |                  |                   |                   | 0.00                    | 0   | A        | 0    | 0    | 0.00                                                | 0   | A        | 0    | 0    |
| <b>Total</b>                                                                          |                         |                  |                  |                   |                   | <b>10</b>               |     | <b>A</b> |      |      | <b>10</b>                                           |     | <b>A</b> |      |      |

- a Volume to capacity ratio.  
b Average total delay, in seconds per vehicle.  
c Level-of-service.  
d 50th percentile queue, in feet.  
e 95th percentile queue, in feet.  
# 95th percentile volume exceeds capacity, queue may be longer.

**Table A-2 Unsignalized Intersection Capacity Analysis**

| Location / Movement                                                     | 2018 Existing Condition |                  |                  |                  |                   | 2025 No-Build Condition |       |      |     |      | 2025 Build Condition with Robust Shuttle Service |       |      |     |      |
|-------------------------------------------------------------------------|-------------------------|------------------|------------------|------------------|-------------------|-------------------------|-------|------|-----|------|--------------------------------------------------|-------|------|-----|------|
|                                                                         | D <sup>a</sup>          | v/c <sup>b</sup> | Del <sup>c</sup> | LOS <sup>d</sup> | 95 Q <sup>e</sup> | D                       | v/c   | Del  | LOS | 95 Q | D                                                | v/c   | Del  | LOS | 95 Q |
| <b>1: Chestnut Street at Route 9 Westbound Service Road<sup>f</sup></b> |                         |                  |                  |                  |                   |                         |       |      |     |      |                                                  |       |      |     |      |
| <i>Weekday Morning</i>                                                  |                         |                  |                  |                  |                   |                         |       |      |     |      |                                                  |       |      |     |      |
| EB L/T/R                                                                | 40                      | 1.04             | 77               | F                | 578               | 40                      | 0.11  | 13   | B   | 8    | 40                                               | 0.11  | 13   | B   | 8    |
| WB L/T/R                                                                | 180                     | 0.11             | 12               | B                | 8                 | 190                     | 0.44  | 16   | C   | 50   | 190                                              | 0.44  | 16   | C   | 50   |
| SB L/T/R                                                                | 565                     | 0.90             | 38               | E                | 248               | 615                     | 1.09  | 72   | F   | 428  | 620                                              | 1.10  | 74   | F   | 433  |
| <i>Weekday Evening</i>                                                  |                         |                  |                  |                  |                   |                         |       |      |     |      |                                                  |       |      |     |      |
| EB L/T/R                                                                | 145                     | 0.94             | 46               | E                | 245               | 150                     | 0.41  | 17   | C   | 43   | 150                                              | 0.42  | 18   | C   | 43   |
| WB L/T/R                                                                | 175                     | 0.39             | 16               | C                | 43                | 180                     | 0.47  | 18   | C   | 53   | 185                                              | 0.50  | 19   | C   | 55   |
| SB L/T/R                                                                | 615                     | 1.09             | 95               | F                | 495               | 655                     | >1.20 | >120 | F   | 665  | 680                                              | >1.20 | >120 | F   | 733  |
| <i>Saturday Midday</i>                                                  |                         |                  |                  |                  |                   |                         |       |      |     |      |                                                  |       |      |     |      |
| EB L/T/R                                                                | 5                       | 0.64             | 17               | C                | 118               | 5                       | 0.01  | 10   | A   | 0    | 5                                                | 0.01  | 10   | B   | 0    |
| WB L/T/R                                                                | 120                     | 0.01             | 10               | A                | 0                 | 125                     | 0.24  | 12   | B   | 23   | 130                                              | 0.26  | 12   | B   | 25   |
| SB L/T/R                                                                | 510                     | 0.69             | 18               | C                | 140               | 545                     | 0.80  | 25   | C   | 110  | 580                                              | 0.87  | 33   | D   | 268  |
| <b>2: Chestnut Street at Route 9 Eastbound Service Road<sup>f</sup></b> |                         |                  |                  |                  |                   |                         |       |      |     |      |                                                  |       |      |     |      |
| <i>Weekday Morning</i>                                                  |                         |                  |                  |                  |                   |                         |       |      |     |      |                                                  |       |      |     |      |
| EB L/T/R                                                                | 305                     | 0.67             | 20               | C                | 128               | 325                     | 0.67  | 23   | C   | 125  | 325                                              | 0.68  | 24   | C   | 128  |
| WB L/T/R                                                                | 45                      | 0.57             | 18               | C                | 88                | 45                      | 0.10  | 11   | B   | 8    | 45                                               | 0.10  | 12   | B   | 8    |
| NB L/T/R                                                                | 400                     | 0.10             | 10               | B                | 8                 | 430                     | 0.81  | 31   | D   | 200  | 445                                              | 0.84  | 35   | D   | 225  |
| <i>Weekday Evening</i>                                                  |                         |                  |                  |                  |                   |                         |       |      |     |      |                                                  |       |      |     |      |
| EB L/T/R                                                                | 330                     | 0.57             | 17               | C                | 88                | 345                     | 0.74  | 26   | D   | 143  | 350                                              | 0.76  | 28   | D   | 150  |
| WB L/T/R                                                                | 20                      | 0.62             | 20               | C                | 108               | 20                      | 0.06  | 12   | B   | 5    | 20                                               | 0.06  | 12   | B   | 5    |
| NB L/T/R                                                                | 320                     | 0.06             | 11               | B                | 5                 | 385                     | 0.77  | 26   | D   | 160  | 415                                              | 0.84  | 32   | D   | 195  |
| <i>Saturday Midday</i>                                                  |                         |                  |                  |                  |                   |                         |       |      |     |      |                                                  |       |      |     |      |
| EB L/T/R                                                                | 240                     | 0.56             | 15               | C                | 85                | 260                     | 0.51  | 16   | C   | 70   | 265                                              | 0.54  | 18   | C   | 80   |
| WB L/T/R                                                                | 20                      | 0.47             | 14               | B                | 63                | 20                      | 0.05  | 10   | B   | 3    | 20                                               | 0.05  | 11   | B   | 5    |
| NB L/T/R                                                                | 345                     | 0.04             | 10               | A                | 3                 | 385                     | 0.66  | 19   | C   | 120  | 430                                              | 0.76  | 26   | D   | 178  |
| <b>5: Oak Street at Site Driveway</b>                                   |                         |                  |                  |                  |                   |                         |       |      |     |      |                                                  |       |      |     |      |
| <i>Weekday Morning</i>                                                  |                         |                  |                  |                  |                   |                         |       |      |     |      |                                                  |       |      |     |      |
| WB L/R                                                                  | neg                     | 0.02             | 15               | B                | 3                 | 20                      | 0.08  | 19   | C   | 5    | 55                                               | 0.18  | 18   | C   | 15   |
| SB L                                                                    | neg                     | -                | 8                | A                | 0                 | 25                      | 0.03  | 9    | A   | 3    | 30                                               | 0.03  | 9    | A   | 3    |
| <i>Weekday Evening</i>                                                  |                         |                  |                  |                  |                   |                         |       |      |     |      |                                                  |       |      |     |      |
| WB L/R                                                                  | neg                     | 0.01             | 14               | B                | 0                 | 120                     | 0.41  | 24   | C   | 48   | 125                                              | 0.40  | 23   | C   | 48   |
| SB L                                                                    | neg                     | -                | 8                | A                | 0                 | 5                       | 0.01  | 8    | A   | 0    | 50                                               | 0.05  | 9    | A   | 5    |
| <i>Saturday Midday</i>                                                  |                         |                  |                  |                  |                   |                         |       |      |     |      |                                                  |       |      |     |      |
| WB L                                                                    | neg                     | 0.05             | 15               | C                | 0                 | 35                      | 0.12  | 18   | C   | 10   | 130                                              | 0.44  | 25   | C   | 55   |
| SB L                                                                    | neg                     | -                | 8                | A                | 0                 | 5                       | 0.01  | 8    | A   | 0    | 65                                               | 0.06  | 8    | A   | 5    |
| <b>7: Needham Street at South Site Driveway</b>                         |                         |                  |                  |                  |                   |                         |       |      |     |      |                                                  |       |      |     |      |
| <i>Weekday Morning</i>                                                  |                         |                  |                  |                  |                   |                         |       |      |     |      |                                                  |       |      |     |      |
| EB L/R                                                                  | neg                     | -                | 0                | A                | 0                 | neg                     | 0.02  | 35   | E   | 3    | 55                                               | 0.30  | 30   | D   | 30   |
| NB L                                                                    | neg                     | -                | 0                | A                | 0                 | 5                       | 0.01  | 10   | A   | 0    | 20                                               | 0.03  | 10   | A   | 3    |
| <i>Weekday Evening</i>                                                  |                         |                  |                  |                  |                   |                         |       |      |     |      |                                                  |       |      |     |      |
| EB L/R                                                                  | neg                     | -                | 0                | A                | 0                 | 10                      | 0.11  | 47   | E   | 10   | 145                                              | 0.67  | 47   | E   | 105  |
| NB L                                                                    | neg                     | -                | 0                | A                | 0                 | neg                     | 0.00  | 10   | B   | 0    | 40                                               | 0.06  | 10   | B   | 5    |
| <i>Saturday Midday</i>                                                  |                         |                  |                  |                  |                   |                         |       |      |     |      |                                                  |       |      |     |      |
| EB L/R                                                                  | neg                     | 0.04             | 44               | E                | 3                 | 5                       | 0.11  | 71   | F   | 8    | 180                                              | 1.16  | >120 | F   | 260  |
| NB L                                                                    | neg                     | -                | 0                | A                | 0                 | neg                     | 0.00  | 10   | B   | 0    | 110                                              | 0.17  | 11   | B   | 15   |

a Demand.

b Volume to capacity ratio.

c Average total delay, in seconds per vehicle.

d Level-of-service.

e 95th percentile queue, in feet.

f Analyzed as all-way STOP controlled.

**Table A-2 Unsignalized Intersection Capacity Analysis (continued)**

| Location / Movement                                                            | 2018 Existing Condition |                  |                  |                  |                   | 2025 No-Build Condition                                 |       |      |     |      | 2025 Build Condition with Robust Shuttle Service     |       |      |     |      |
|--------------------------------------------------------------------------------|-------------------------|------------------|------------------|------------------|-------------------|---------------------------------------------------------|-------|------|-----|------|------------------------------------------------------|-------|------|-----|------|
|                                                                                | D <sup>a</sup>          | v/c <sup>b</sup> | Del <sup>c</sup> | LOS <sup>d</sup> | 95 Q <sup>e</sup> | D                                                       | v/c   | Del  | LOS | 95 Q | D                                                    | v/c   | Del  | LOS | 95 Q |
| 8: Needham Street at Middle Site Driveway/Former TJ Maxx Driveway <sup>f</sup> |                         |                  |                  |                  |                   |                                                         |       |      |     |      |                                                      |       |      |     |      |
| Weekday Morning                                                                |                         |                  |                  |                  |                   |                                                         |       |      |     |      |                                                      |       |      |     |      |
| EB L/T/R                                                                       | 25                      | 0.10             | 19               | C                | 8                 | 25                                                      | 0.13  | 26   | D   | 13   | N/A                                                  | N/A   | N/A  | N/A | N/A  |
| NB L                                                                           | 15                      | 0.02             | 9                | A                | 3                 | 15                                                      | 0.02  | 10   | A   | 3    | N/A                                                  | N/A   | N/A  | N/A | N/A  |
| SB L                                                                           | 5                       | 0.01             | 9                | A                | 0                 | 5                                                       | 0.01  | 10   | A   | 0    | 5                                                    | 0.01  | 10   | B   | 0    |
| Weekday Evening                                                                |                         |                  |                  |                  |                   |                                                         |       |      |     |      |                                                      |       |      |     |      |
| EB L/T/R                                                                       | 90                      | 0.25             | 18               | C                | 25                | 90                                                      | 0.34  | 24   | C   | 38   | N/A                                                  | N/A   | N/A  | N/A | N/A  |
| NB L                                                                           | 35                      | 0.04             | 9                | A                | 3                 | 35                                                      | 0.05  | 10   | A   | 5    | N/A                                                  | N/A   | N/A  | N/A | N/A  |
| SB L                                                                           | 10                      | 0.01             | 9                | A                | 0                 | 10                                                      | 0.02  | 10   | B   | 0    | 10                                                   | 0.02  | 10   | B   | 0    |
| Saturday Midday                                                                |                         |                  |                  |                  |                   |                                                         |       |      |     |      |                                                      |       |      |     |      |
| EB L/T/R                                                                       | 120                     | 0.43             | 25               | D                | 50                | 120                                                     | 0.61  | 45   | E   | 88   | N/A                                                  | N/A   | N/A  | N/A | N/A  |
| NB L                                                                           | 100                     | 0.12             | 10               | A                | 10                | 100                                                     | 0.15  | 11   | B   | 13   | N/A                                                  | N/A   | N/A  | N/A | N/A  |
| SB L                                                                           | 10                      | 0.01             | 9                | A                | 0                 | 10                                                      | 0.02  | 10   | B   | 0    | 10                                                   | 0.02  | 11   | B   | 3    |
| 9: Needham Street at North Site Driveway/Charlemont Street                     |                         |                  |                  |                  |                   |                                                         |       |      |     |      |                                                      |       |      |     |      |
| Weekday Morning                                                                |                         |                  |                  |                  |                   | Intersection to be Signalized under No-Build Conditions |       |      |     |      | Intersection to be Signalized under Build Conditions |       |      |     |      |
| EB L/T/R                                                                       | 10                      | 0.29             | 29               | D                | 8                 |                                                         |       |      |     |      |                                                      |       |      |     |      |
| WB L/T/R                                                                       | 35                      | 0.09             | 37               | E                | 30                |                                                         |       |      |     |      |                                                      |       |      |     |      |
| NB L                                                                           | 15                      | 0.02             | 9                | A                | 3                 |                                                         |       |      |     |      |                                                      |       |      |     |      |
| SB L                                                                           | 5                       | 0.01             | 9                | A                | 0                 |                                                         |       |      |     |      |                                                      |       |      |     |      |
| Weekday Evening                                                                |                         |                  |                  |                  |                   |                                                         |       |      |     |      |                                                      |       |      |     |      |
| EB L/T/R                                                                       | 110                     | 1.01             | >120             | F                | 165               |                                                         |       |      |     |      |                                                      |       |      |     |      |
| WB L/T/R                                                                       | 45                      | 0.34             | 42               | E                | 35                |                                                         |       |      |     |      |                                                      |       |      |     |      |
| NB L                                                                           | 25                      | 0.03             | 9                | A                | 3                 |                                                         |       |      |     |      |                                                      |       |      |     |      |
| SB L                                                                           | 5                       | 0.01             | 9                | A                | 0                 |                                                         |       |      |     |      |                                                      |       |      |     |      |
| Saturday Midday                                                                |                         |                  |                  |                  |                   |                                                         |       |      |     |      |                                                      |       |      |     |      |
| EB L/T/R                                                                       | 110                     | 1.11             | >120             | F                | 188               |                                                         |       |      |     |      |                                                      |       |      |     |      |
| WB L/T/R                                                                       | 75                      | 0.80             | 108              | F                | 115               |                                                         |       |      |     |      |                                                      |       |      |     |      |
| NB L                                                                           | 25                      | 0.03             | 9                | A                | 3                 |                                                         |       |      |     |      |                                                      |       |      |     |      |
| SB L                                                                           | 10                      | 0.01             | 9                | A                | 0                 |                                                         |       |      |     |      |                                                      |       |      |     |      |
| 10: Needham Street at Tower Road/Industrial Place                              |                         |                  |                  |                  |                   |                                                         |       |      |     |      |                                                      |       |      |     |      |
| Weekday Morning                                                                |                         |                  |                  |                  |                   |                                                         |       |      |     |      |                                                      |       |      |     |      |
| EB L/T/R                                                                       | 20                      | 0.15             | 26               | D                | 13                | 20                                                      | 0.16  | 36   | E   | 15   | 40                                                   | 0.62  | 118  | F   | 68   |
| WB L/T/R                                                                       | 15                      | 0.14             | 30               | D                | 13                | 15                                                      | 0.15  | 43   | E   | 13   | 15                                                   | 0.16  | 46   | E   | 13   |
| NB L                                                                           | 15                      | 0.02             | 10               | A                | 3                 | 15                                                      | 0.02  | 10   | B   | 3    | 15                                                   | 0.02  | 10   | B   | 3    |
| SB L                                                                           | 5                       | 0.01             | 9                | A                | 0                 | 5                                                       | 0.01  | 10   | A   | 0    | 5                                                    | 0.01  | 10   | A   | 0    |
| Weekday Evening                                                                |                         |                  |                  |                  |                   |                                                         |       |      |     |      |                                                      |       |      |     |      |
| EB L/T/R                                                                       | 145                     | >1.20            | >120             | F                | 305               | 145                                                     | >1.20 | >120 | F   | 395  | 185                                                  | >1.20 | >120 | F   | 583  |
| WB L/T/R                                                                       | 115                     | >1.20            | >120             | F                | 255               | 115                                                     | >1.20 | >120 | F   | 335  | 115                                                  | >1.20 | >120 | F   | 360  |
| NB L                                                                           | 65                      | 0.08             | 9                | A                | 5                 | 65                                                      | 0.09  | 10   | A   | 8    | 65                                                   | 0.09  | 10   | B   | 8    |
| SB L                                                                           | 20                      | 0.03             | 9                | A                | 3                 | 20                                                      | 0.03  | 10   | B   | 3    | 20                                                   | 0.03  | 10   | B   | 3    |
| Saturday Midday                                                                |                         |                  |                  |                  |                   |                                                         |       |      |     |      |                                                      |       |      |     |      |
| EB L/T/R                                                                       | 165                     | >1.20            | >120             | F                | 418               | 165                                                     | >1.20 | >120 | F   | 500  | 205                                                  | >1.20 | >120 | F   | 705  |
| WB L/T/R                                                                       | 115                     | >1.20            | >120             | F                | 215               | 115                                                     | >1.20 | >120 | F   | 318  | 115                                                  | >1.20 | >120 | F   | 363  |
| NB L                                                                           | 45                      | 0.05             | 9                | A                | 5                 | 45                                                      | 0.06  | 10   | A   | 5    | 45                                                   | 0.07  | 10   | B   | 5    |
| SB L                                                                           | 20                      | 0.03             | 10               | A                | 3                 | 20                                                      | 0.03  | 10   | B   | 3    | 20                                                   | 0.03  | 11   | B   | 3    |

a Demand.

b Volume to capacity ratio.

c Average total delay, in seconds per vehicle.

d Level-of-service.

e 95th percentile queue, in feet.

f Middle Site Driveway to be Removed under Build Conditions

**Table A-2 Unsignalized Intersection Capacity Analysis (continued)**

| Location / Movement                                     | 2018 Existing Condition |                  |                  |                  |                   | 2025 No-Build Condition                                 |      |     |     |      | 2025 Build Condition with Robust Shuttle Service     |      |      |     |      |
|---------------------------------------------------------|-------------------------|------------------|------------------|------------------|-------------------|---------------------------------------------------------|------|-----|-----|------|------------------------------------------------------|------|------|-----|------|
|                                                         | D <sup>a</sup>          | v/c <sup>b</sup> | Del <sup>c</sup> | LOS <sup>d</sup> | 95 Q <sup>e</sup> | D                                                       | v/c  | Del | LOS | 95 Q | D                                                    | v/c  | Del  | LOS | 95 Q |
| 11: Needham Street at Jaconnet Street                   |                         |                  |                  |                  |                   |                                                         |      |     |     |      |                                                      |      |      |     |      |
| Weekday Morning                                         |                         |                  |                  |                  |                   |                                                         |      |     |     |      |                                                      |      |      |     |      |
| WB L/R                                                  | 15                      | 0.08             | 20               | C                | 8                 | 15                                                      | 0.10 | 28  | D   | 8    | 15                                                   | 0.10 | 30   | D   | 8    |
| SB L                                                    | neg                     | -                | 9                | A                | 0                 | neg                                                     | 0.00 | 10  | A   | 0    | neg                                                  | 0.00 | 10   | A   | 0    |
| Weekday Evening                                         |                         |                  |                  |                  |                   |                                                         |      |     |     |      |                                                      |      |      |     |      |
| WB L/R                                                  | 85                      | 0.01             | 43               | E                | 143               | 85                                                      | 0.84 | 119 | F   | 123  | 85                                                   | 1.06 | >120 | F   | 155  |
| SB L                                                    | 10                      | 0.52             | 9                | A                | 0                 | 10                                                      | 0.02 | 10  | B   | 0    | 10                                                   | 0.02 | 11   | B   | 3    |
| Saturday Midday                                         |                         |                  |                  |                  |                   |                                                         |      |     |     |      |                                                      |      |      |     |      |
| WB L/R                                                  | 45                      | 0.34             | 42               | E                | 35                | 45                                                      | 0.53 | 82  | F   | 60   | 45                                                   | 0.74 | >120 | F   | 83   |
| SB L                                                    | 20                      | 0.03             | 10               | B                | 3                 | 20                                                      | 0.04 | 11  | B   | 3    | 20                                                   | 0.04 | 12   | B   | 3    |
| 12: Needham Street at Rockland Street                   |                         |                  |                  |                  |                   |                                                         |      |     |     |      |                                                      |      |      |     |      |
| Weekday Morning                                         |                         |                  |                  |                  |                   |                                                         |      |     |     |      |                                                      |      |      |     |      |
| WB L/R                                                  | 10                      | 0.05             | 22               | C                | 5                 | 10                                                      | 0.08 | 34  | D   | 8    | 10                                                   | 0.09 | 36   | E   | 8    |
| SB L                                                    | 10                      | 0.01             | 9                | A                | 0                 | 10                                                      | 0.01 | 9   | A   | 0    | 10                                                   | 0.14 | 10   | A   | 0    |
| Weekday Evening                                         |                         |                  |                  |                  |                   |                                                         |      |     |     |      |                                                      |      |      |     |      |
| WB L/R                                                  | 15                      | 0.07             | 20               | C                | 5                 | 15                                                      | 0.11 | 32  | D   | 10   | 15                                                   | 0.13 | 38   | E   | 10   |
| SB L                                                    | 15                      | 0.02             | 9                | A                | 3                 | 15                                                      | 0.02 | 11  | B   | 3    | 15                                                   | 0.03 | 11   | B   | 3    |
| Saturday Midday                                         |                         |                  |                  |                  |                   |                                                         |      |     |     |      |                                                      |      |      |     |      |
| WB L/R                                                  | 30                      | 0.22             | 34               | D                | 20                | 30                                                      | 0.31 | 54  | F   | 30   | 30                                                   | 0.44 | 86   | F   | 43   |
| SB L                                                    | 20                      | 0.03             | 10               | A                | 3                 | 20                                                      | 0.03 | 11  | B   | 3    | 20                                                   | 0.04 | 12   | B   | 3    |
| 15: Winchester Street at Route 9 Eastbound Service Road |                         |                  |                  |                  |                   |                                                         |      |     |     |      |                                                      |      |      |     |      |
| Weekday Morning                                         |                         |                  |                  |                  |                   | Intersection to be Signalized under No-Build Conditions |      |     |     |      | Intersection to be Signalized under Build Conditions |      |      |     |      |
| WB L/R                                                  | 305                     | >1.20            | >120             | F                | 720               |                                                         |      |     |     |      |                                                      |      |      |     |      |
| SB L                                                    | 65                      | 0.12             | 13               | B                | 10                |                                                         |      |     |     |      |                                                      |      |      |     |      |
| Weekday Evening                                         |                         |                  |                  |                  |                   |                                                         |      |     |     |      |                                                      |      |      |     |      |
| WB L/R                                                  | 170                     | >1.20            | >120             | F                | 443               |                                                         |      |     |     |      |                                                      |      |      |     |      |
| SB L                                                    | 120                     | 0.20             | 12               | B                | 18                |                                                         |      |     |     |      |                                                      |      |      |     |      |
| Saturday Midday                                         |                         |                  |                  |                  |                   |                                                         |      |     |     |      |                                                      |      |      |     |      |
| WB L/R                                                  | 180                     | >1.20            | >120             | F                | 645               |                                                         |      |     |     |      |                                                      |      |      |     |      |
| SB L                                                    | 135                     | 0.22             | 12               | B                | 23                |                                                         |      |     |     |      |                                                      |      |      |     |      |
| 16: Winchester Street at Route 9 Westbound Service Road |                         |                  |                  |                  |                   |                                                         |      |     |     |      |                                                      |      |      |     |      |
| Weekday Morning                                         |                         |                  |                  |                  |                   | Intersection to be Signalized under No-Build Conditions |      |     |     |      | Intersection to be Signalized under Build Conditions |      |      |     |      |
| EB L/T/R                                                | 40                      | 0.20             | 19               | C                | 18                |                                                         |      |     |     |      |                                                      |      |      |     |      |
| WB L/T                                                  | 135                     | >1.20            | >120             | F                | 495               |                                                         |      |     |     |      |                                                      |      |      |     |      |
| WB R                                                    | 15                      | 0.06             | 20               | C                | 5                 |                                                         |      |     |     |      |                                                      |      |      |     |      |
| NB L                                                    | 215                     | 0.32             | 12               | B                | 35                |                                                         |      |     |     |      |                                                      |      |      |     |      |
| Weekday Evening                                         |                         |                  |                  |                  |                   |                                                         |      |     |     |      |                                                      |      |      |     |      |
| EB L/T/R                                                | 40                      | 0.39             | 41               | E                | 43                |                                                         |      |     |     |      |                                                      |      |      |     |      |
| WB L/T                                                  | 120                     | >1.20            | >120             | F                | 445               |                                                         |      |     |     |      |                                                      |      |      |     |      |
| WB R                                                    | 20                      | 0.07             | 15               | C                | 5                 |                                                         |      |     |     |      |                                                      |      |      |     |      |
| NB L                                                    | 125                     | 0.16             | 10               | B                | 15                |                                                         |      |     |     |      |                                                      |      |      |     |      |
| Saturday Midday                                         |                         |                  |                  |                  |                   |                                                         |      |     |     |      |                                                      |      |      |     |      |
| EB L/T/R                                                | 40                      | 0.14             | 17               | C                | 13                |                                                         |      |     |     |      |                                                      |      |      |     |      |
| WB L/T                                                  | 165                     | >120             | >120             | F                | 483               |                                                         |      |     |     |      |                                                      |      |      |     |      |
| WB R                                                    | 15                      | 0.04             | 14               | B                | 3                 |                                                         |      |     |     |      |                                                      |      |      |     |      |
| NB L                                                    | 180                     | 0.22             | 10               | C                | 20                |                                                         |      |     |     |      |                                                      |      |      |     |      |

- a Demand.  
b Volume to capacity ratio.  
c Average total delay, in seconds per vehicle.  
d Level-of-service.  
e 95th percentile queue, in feet.

**Table A-2 Unsignalized Intersection Capacity Analysis (continued)**

| Location / Movement                                            | 2018 Existing Condition |                  |                  |                  |                   | 2025 No-Build Condition |      |     |     |      | 2025 Build Condition with Robust Shuttle Service |      |     |     |      |
|----------------------------------------------------------------|-------------------------|------------------|------------------|------------------|-------------------|-------------------------|------|-----|-----|------|--------------------------------------------------|------|-----|-----|------|
|                                                                | D <sup>a</sup>          | v/c <sup>b</sup> | Del <sup>c</sup> | LOS <sup>d</sup> | 95 Q <sup>e</sup> | D                       | v/c  | Del | LOS | 95 Q | D                                                | v/c  | Del | LOS | 95 Q |
| <b>20: Highland Avenue at Riverside Street</b>                 |                         |                  |                  |                  |                   |                         |      |     |     |      |                                                  |      |     |     |      |
| <i>Weekday Morning</i>                                         |                         |                  |                  |                  |                   |                         |      |     |     |      |                                                  |      |     |     |      |
| NWB L/R                                                        | 10                      | 0.14             | 43               | E                | 10                | 10                      | 0.23 | 92  | F   | 20   | 10                                               | 0.25 | 103 | F   | 20   |
| SWB L                                                          | neg                     | -                | 10               | A                | 0                 | neg                     | 0.00 | 11  | B   | 0    | neg                                              | 0.00 | 11  | B   | 0    |
| <i>Weekday Evening</i>                                         |                         |                  |                  |                  |                   |                         |      |     |     |      |                                                  |      |     |     |      |
| NWB L/R                                                        | 10                      | 0.11             | 29               | D                | 10                | 10                      | 0.13 | 54  | F   | 10   | 10                                               | 0.15 | 65  | F   | 13   |
| SWB L                                                          | neg                     | -                | 9                | A                | 0                 | neg                     | 0.00 | 10  | A   | 0    | neg                                              | 0.00 | 10  | B   | 0    |
| <i>Saturday Midday</i>                                         |                         |                  |                  |                  |                   |                         |      |     |     |      |                                                  |      |     |     |      |
| NWB L/R                                                        | 15                      | 0.11             | 25               | C                | 8                 | 15                      | 0.13 | 38  | E   | 10   | 15                                               | 0.17 | 50  | E   | 15   |
| SWB L                                                          | 5                       | 0.01             | 9                | A                | 0                 | 5                       | 0.01 | 10  | B   | 0    | 5                                                | 0.01 | 11  | B   | 0    |
| <b>21: Highland Avenue at Highland Terrace/Highland Circle</b> |                         |                  |                  |                  |                   |                         |      |     |     |      |                                                  |      |     |     |      |
| <i>Weekday Morning</i>                                         |                         |                  |                  |                  |                   |                         |      |     |     |      |                                                  |      |     |     |      |
| NEB L                                                          | 5                       | 0.01             | 10               | A                | 0                 | 5                       | 0.01 | 10  | B   | 0    | 5                                                | 0.01 | 11  | B   | 0    |
| SWB L                                                          | neg                     | -                | 10               | A                | 0                 | neg                     | 0.00 | 11  | B   | 0    | neg                                              | 0.00 | 11  | B   | 0    |
| NWB L/T/R                                                      | 10                      | 0.11             | 41               | E                | 10                | 10                      | 0.10 | 40  | E   | 8    | 10                                               | 0.10 | 42  | E   | 8    |
| SEB L/T/R                                                      | 5                       | 0.07             | 23               | C                | 5                 | 5                       | 0.03 | 20  | C   | 3    | 5                                                | 0.03 | 21  | C   | 3    |
| <i>Weekday Evening</i>                                         |                         |                  |                  |                  |                   |                         |      |     |     |      |                                                  |      |     |     |      |
| NEB L                                                          | 10                      | 0.01             | 10               | B                | 0                 | 10                      | 0.02 | 11  | B   | 3    | 10                                               | 0.02 | 12  | B   | 3    |
| SWB L                                                          | 5                       | 0.01             | 9                | A                | 0                 | 5                       | 0.01 | 10  | B   | 0    | 5                                                | 0.01 | 10  | B   | 0    |
| NWB L/T/R                                                      | 5                       | 0.17             | 59               | F                | 15                | 5                       | 0.09 | 49  | E   | 8    | 5                                                | 0.10 | 59  | F   | 8    |
| SEB L/T/R                                                      | 20                      | 0.25             | 24               | D                | 25                | 20                      | 0.13 | 31  | D   | 13   | 20                                               | 0.15 | 35  | D   | 13   |
| <i>Saturday Midday</i>                                         |                         |                  |                  |                  |                   |                         |      |     |     |      |                                                  |      |     |     |      |
| NEB L                                                          | 10                      | 0.01             | 10               | A                | 0                 | 10                      | 0.02 | 11  | B   | 3    | 10                                               | 0.02 | 12  | B   | 3    |
| SWB L                                                          | neg                     | 0.00             | 9                | A                | 0                 | neg                     | 0.00 | 10  | A   | 0    | neg                                              | 0.00 | 10  | B   | 0    |
| NWB L/T/R                                                      | 15                      | 0.20             | 53               | F                | 18                | 15                      | 0.16 | 46  | E   | 13   | 15                                               | 0.20 | 60  | F   | 18   |
| SEB L/T/R                                                      | 15                      | 0.14             | 33               | D                | 13                | 15                      | 0.11 | 31  | D   | 10   | 15                                               | 0.13 | 39  | E   | 10   |
| <b>23: Highland Avenue at Charles Street</b>                   |                         |                  |                  |                  |                   |                         |      |     |     |      |                                                  |      |     |     |      |
| <i>Weekday Morning</i>                                         |                         |                  |                  |                  |                   |                         |      |     |     |      |                                                  |      |     |     |      |
| EB L                                                           | 30                      | 0.04             | 10               | B                | 3                 | 30                      | 0.04 | 10  | A   | 3    | 30                                               | 0.04 | 10  | A   | 3    |
| SB L/R                                                         | 40                      | 0.13             | 16               | C                | 10                | 40                      | 0.11 | 16  | C   | 10   | 40                                               | 0.12 | 16  | C   | 10   |
| <i>Weekday Evening</i>                                         |                         |                  |                  |                  |                   |                         |      |     |     |      |                                                  |      |     |     |      |
| EB L                                                           | 65                      | 0.15             | 14               | B                | 13                | 65                      | 0.14 | 14  | B   | 13   | 65                                               | 0.15 | 14  | B   | 13   |
| SB L/R                                                         | 130                     | 0.78             | 74               | F                | 128               | 130                     | 0.73 | 63  | F   | 118  | 130                                              | 0.81 | 80  | F   | 138  |
| <i>Saturday Midday</i>                                         |                         |                  |                  |                  |                   |                         |      |     |     |      |                                                  |      |     |     |      |
| EB L                                                           | 45                      | 0.07             | 11               | B                | 5                 | 45                      | 0.08 | 11  | B   | 8    | 45                                               | 0.09 | 12  | B   | 8    |
| SB L/R                                                         | 145                     | 0.59             | 35               | E                | 88                | 145                     | 0.69 | 50  | E   | 110  | 145                                              | 0.82 | 76  | F   | 145  |

- a Demand.  
b Volume to capacity ratio.  
c Average total delay, in seconds per vehicle.  
d Level-of-service.  
e 95th percentile queue, in feet.

**Table A-2 Unsignalized Intersection Capacity Analysis (continued)**

| Location / Movement                                                             | 2018 Existing Condition |                  |                  |                  |                   | 2025 No-Build Condition                                 |       |      |     |       | 2025 Build Condition with Robust Shuttle Service     |       |      |     |       |
|---------------------------------------------------------------------------------|-------------------------|------------------|------------------|------------------|-------------------|---------------------------------------------------------|-------|------|-----|-------|------------------------------------------------------|-------|------|-----|-------|
|                                                                                 | D <sup>a</sup>          | v/c <sup>b</sup> | Del <sup>c</sup> | LOS <sup>d</sup> | 95 Q <sup>e</sup> | D                                                       | v/c   | Del  | LOS | 95 Q  | D                                                    | v/c   | Del  | LOS | 95 Q  |
| 24: Highland Avenue at Wexford Street                                           |                         |                  |                  |                  |                   |                                                         |       |      |     |       |                                                      |       |      |     |       |
| Weekday Morning                                                                 |                         |                  |                  |                  |                   |                                                         |       |      |     |       |                                                      |       |      |     |       |
| EB L                                                                            | 115                     | 0.16             | 11               | B                | 15                | 115                                                     | 0.16  | 10   | B   | 13    | 115                                                  | 0.16  | 11   | B   | 15    |
| SB L/R                                                                          | 115                     | 0.83             | 87               | F                | 140               | 115                                                     | 0.69  | 61   | F   | 105   | 115                                                  | 0.77  | 77   | F   | 122   |
| Weekday Evening                                                                 |                         |                  |                  |                  |                   |                                                         |       |      |     |       |                                                      |       |      |     |       |
| EB L                                                                            | 110                     | 0.25             | 16               | C                | 25                | 110                                                     | 0.24  | 15   | B   | 23    | 110                                                  | 0.25  | 15   | C   | 25    |
| SB L/R                                                                          | 230                     | >1.20            | >120             | F                | 385               | 230                                                     | >1.20 | >120 | F   | 353   | 230                                                  | >1.20 | >120 | F   | 393   |
| Saturday Midday                                                                 |                         |                  |                  |                  |                   |                                                         |       |      |     |       |                                                      |       |      |     |       |
| EB L                                                                            | 90                      | 0.15             | 12               | B                | 13                | 90                                                      | 0.17  | 12   | B   | 15    | 90                                                   | 0.18  | 13   | B   | 18    |
| SB L/R                                                                          | 170                     | 0.89             | 85               | F                | 173               | 170                                                     | 1.06  | >120 | F   | 225   | 170                                                  | >1.20 | >120 | F   | 283   |
| 25: Highland Avenue at 1 <sup>st</sup> Avenue/Riverside Community Care Driveway |                         |                  |                  |                  |                   |                                                         |       |      |     |       |                                                      |       |      |     |       |
| Weekday Morning                                                                 |                         |                  |                  |                  |                   | Intersection to be Signalized under No-Build Conditions |       |      |     |       | Intersection to be Signalized under Build Conditions |       |      |     |       |
| EB L/T                                                                          | neg                     | -                | 0                | A                | 0                 |                                                         |       |      |     |       |                                                      |       |      |     |       |
| WB L/T                                                                          | 5                       | 0.01             | 11               | B                | 0                 |                                                         |       |      |     |       |                                                      |       |      |     |       |
| NB L/T/R                                                                        | 75                      | 0.20             | 15               | B                | 18                |                                                         |       |      |     |       |                                                      |       |      |     |       |
| SB L/T/R                                                                        | 15                      | 0.08             | 12               | B                | 5                 |                                                         |       |      |     |       |                                                      |       |      |     |       |
| Weekday Evening                                                                 |                         |                  |                  |                  |                   |                                                         |       |      |     |       |                                                      |       |      |     |       |
| EB L/T                                                                          | neg                     | -                | 0                | A                | 0                 |                                                         |       |      |     |       |                                                      |       |      |     |       |
| WB L/T                                                                          | 5                       | 0.01             | 9                | A                | 0                 |                                                         |       |      |     |       |                                                      |       |      |     |       |
| NB L/T/R                                                                        | 85                      | 0.21             | 13               | C                | 20                |                                                         |       |      |     |       |                                                      |       |      |     |       |
| SB L/T/R                                                                        | 20                      | 0.09             | 18               | B                | 8                 |                                                         |       |      |     |       |                                                      |       |      |     |       |
| Saturday Midday                                                                 |                         |                  |                  |                  |                   |                                                         |       |      |     |       |                                                      |       |      |     |       |
| EB L/T                                                                          | neg                     | -                | 0                | A                | 0                 |                                                         |       |      |     |       |                                                      |       |      |     |       |
| WB L/T                                                                          | neg                     | -                | 0                | A                | 0                 |                                                         |       |      |     |       |                                                      |       |      |     |       |
| NB L/T/R                                                                        | neg                     | 0.16             | 11               | B                | 15                |                                                         |       |      |     |       |                                                      |       |      |     |       |
| SB L/T/R                                                                        | neg                     | -                | 0                | A                | 0                 |                                                         |       |      |     |       |                                                      |       |      |     |       |
| 26: I-95 Northbound Ramps at Highland Avenue                                    |                         |                  |                  |                  |                   |                                                         |       |      |     |       |                                                      |       |      |     |       |
| Weekday Morning                                                                 |                         |                  |                  |                  |                   |                                                         |       |      |     |       |                                                      |       |      |     |       |
| NB R                                                                            | 270                     | 0.69             | 31               | D                | 125               | 320                                                     | 1.10  | 117  | F   | 343   | 320                                                  | 1.09  | 115  | F   | 335   |
| SB R                                                                            | 90                      | 0.15             | 11               | B                | 13                | 95                                                      | 0.17  | 12   | B   | 15    | 95                                                   | 0.17  | 12   | B   | 15    |
| Weekday Evening                                                                 |                         |                  |                  |                  |                   |                                                         |       |      |     |       |                                                      |       |      |     |       |
| NB R                                                                            | 165                     | 0.29             | 13               | B                | 30                | 195                                                     | 0.39  | 16   | C   | 45    | 205                                                  | 0.43  | 17   | C   | 55    |
| SB R                                                                            | 105                     | 0.23             | 14               | B                | 23                | 110                                                     | 0.26  | 15   | C   | 25    | 110                                                  | 0.26  | 16   | C   | 25    |
| Saturday Midday                                                                 |                         |                  |                  |                  |                   |                                                         |       |      |     |       |                                                      |       |      |     |       |
| NB R                                                                            | 195                     | 0.30             | 12               | B                | 33                | 230                                                     | 0.40  | 14   | B   | 48    | 240                                                  | 0.44  | 16   | C   | 58    |
| SB R                                                                            | 80                      | 0.16             | 12               | B                | 15                | 85                                                      | 0.18  | 13   | B   | 15    | 85                                                   | 0.18  | 14   | B   | 18    |
| 27: I-95 Southbound Ramps at Highland Avenue                                    |                         |                  |                  |                  |                   |                                                         |       |      |     |       |                                                      |       |      |     |       |
| Weekday Morning                                                                 |                         |                  |                  |                  |                   |                                                         |       |      |     |       |                                                      |       |      |     |       |
| NB R                                                                            | 750                     | >1.20            | >120             | F                | >1000             | 910                                                     | >1.20 | >120 | F   | >1000 | 915                                                  | >1.20 | >120 | F   | >1000 |
| SB R                                                                            | 530                     | 0.71             | 20               | C                | 148               | 550                                                     | 0.82  | 29   | D   | 225   | 550                                                  | 0.83  | 29   | D   | 225   |
| Weekday Evening                                                                 |                         |                  |                  |                  |                   |                                                         |       |      |     |       |                                                      |       |      |     |       |
| NB R                                                                            | 265                     | 0.52             | 18               | C                | 75                | 340                                                     | 0.75  | 31   | D   | 160   | 375                                                  | 0.85  | 41   | E   | 215   |
| SB R                                                                            | 400                     | 0.74             | 25               | D                | 163               | 415                                                     | 0.75  | 26   | D   | 165   | 415                                                  | 0.76  | 28   | D   | 173   |
| Saturday Midday                                                                 |                         |                  |                  |                  |                   |                                                         |       |      |     |       |                                                      |       |      |     |       |
| NB R                                                                            | 260                     | 0.42             | 14               | B                | 53                | 350                                                     | 0.63  | 20   | C   | 110   | 385                                                  | 0.72  | 25   | D   | 148   |
| SB R                                                                            | 420                     | 0.68             | 21               | C                | 133               | 435                                                     | 0.77  | 27   | D   | 175   | 435                                                  | 0.79  | 30   | D   | 190   |

- a Demand.  
b Volume to capacity ratio.  
c Average total delay, in seconds per vehicle.  
d Level-of-service.  
e 95th percentile queue, in feet.





12239.00 :: Needham Street  
1: Chestnut Street & Route 9 WB Access Road

2025 Build Conditions - with Shuttle Service  
Timing Plan: Weekday Morning

| Intersection               |       |       |       |       |      |      |       |      |      |      |      |      |
|----------------------------|-------|-------|-------|-------|------|------|-------|------|------|------|------|------|
| Intersection Delay, s/veh  | 91.4  |       |       |       |      |      |       |      |      |      |      |      |
| Intersection LOS           | F     |       |       |       |      |      |       |      |      |      |      |      |
| Movement                   | EBL   | EBT   | EBR   | WBL   | WBT  | WBR  | NBL   | NBT  | NBR  | SBL  | SBT  | SBR  |
| Lane Configurations        |       | ↔     |       |       | ↔    |      |       | ↔    |      |      | ↔    |      |
| Traffic Vol, veh/h         | 30    | 1     | 10    | 50    | 105  | 35   | 70    | 615  | 1    | 0    | 355  | 265  |
| Future Vol, veh/h          | 30    | 1     | 10    | 50    | 105  | 35   | 70    | 615  | 1    | 0    | 355  | 265  |
| Peak Hour Factor           | 0.92  | 0.92  | 0.92  | 0.92  | 0.92 | 0.92 | 0.92  | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Heavy Vehicles, %          | 0     | 0     | 0     | 0     | 0    | 0    | 0     | 0    | 0    | 0    | 0    | 0    |
| Mvmt Flow                  | 33    | 1     | 11    | 54    | 114  | 38   | 76    | 668  | 1    | 0    | 386  | 288  |
| Number of Lanes            | 0     | 1     | 0     | 0     | 1    | 0    | 0     | 1    | 0    | 0    | 1    | 0    |
| Approach                   | EB    |       |       | WB    |      |      | NB    |      |      | SB   |      |      |
| Opposing Approach          | WB    |       |       | EB    |      |      | SB    |      |      | NB   |      |      |
| Opposing Lanes             | 1     |       |       | 1     |      |      | 1     |      |      | 1    |      |      |
| Conflicting Approach Left  | SB    |       |       | NB    |      |      | EB    |      |      | WB   |      |      |
| Conflicting Lanes Left     | 1     |       |       | 1     |      |      | 1     |      |      | 1    |      |      |
| Conflicting Approach Right | NB    |       |       | SB    |      |      | WB    |      |      | EB   |      |      |
| Conflicting Lanes Right    | 1     |       |       | 1     |      |      | 1     |      |      | 1    |      |      |
| HCM Control Delay          | 12.7  |       |       | 16    |      |      | 132.9 |      |      | 73.8 |      |      |
| HCM LOS                    | B     |       |       | C     |      |      | F     |      |      | F    |      |      |
| Lane                       | NBLn1 | EBLn1 | WBLn1 | SBLn1 |      |      |       |      |      |      |      |      |
| Vol Left, %                | 10%   | 73%   | 26%   | 0%    |      |      |       |      |      |      |      |      |
| Vol Thru, %                | 90%   | 2%    | 55%   | 57%   |      |      |       |      |      |      |      |      |
| Vol Right, %               | 0%    | 24%   | 18%   | 43%   |      |      |       |      |      |      |      |      |
| Sign Control               | Stop  | Stop  | Stop  | Stop  |      |      |       |      |      |      |      |      |
| Traffic Vol by Lane        | 686   | 41    | 190   | 620   |      |      |       |      |      |      |      |      |
| LT Vol                     | 70    | 30    | 50    | 0     |      |      |       |      |      |      |      |      |
| Through Vol                | 615   | 1     | 105   | 355   |      |      |       |      |      |      |      |      |
| RT Vol                     | 1     | 10    | 35    | 265   |      |      |       |      |      |      |      |      |
| Lane Flow Rate             | 746   | 45    | 207   | 674   |      |      |       |      |      |      |      |      |
| Geometry Grp               | 1     | 1     | 1     | 1     |      |      |       |      |      |      |      |      |
| Degree of Util (X)         | 1.216 | 0.1   | 0.412 | 1.048 |      |      |       |      |      |      |      |      |
| Departure Headway (Hd)     | 6.043 | 8.71  | 7.702 | 5.945 |      |      |       |      |      |      |      |      |
| Convergence, Y/N           | Yes   | Yes   | Yes   | Yes   |      |      |       |      |      |      |      |      |
| Cap                        | 604   | 414   | 471   | 613   |      |      |       |      |      |      |      |      |
| Service Time               | 4.043 | 6.71  | 5.702 | 3.945 |      |      |       |      |      |      |      |      |
| HCM Lane V/C Ratio         | 1.235 | 0.109 | 0.439 | 1.1   |      |      |       |      |      |      |      |      |
| HCM Control Delay          | 132.9 | 12.7  | 16    | 73.8  |      |      |       |      |      |      |      |      |
| HCM Lane LOS               | F     | B     | C     | F     |      |      |       |      |      |      |      |      |
| HCM 95th-tile Q            | 26.4  | 0.3   | 2     | 17.3  |      |      |       |      |      |      |      |      |

12239.00 :: Needham Street  
2: Chestnut Street & Route 9 EB Access Road

2025 Build Conditions - with Shuttle Service  
Timing Plan: Weekday Morning

| Intersection               |       |       |       |       |      |      |      |      |      |      |      |      |
|----------------------------|-------|-------|-------|-------|------|------|------|------|------|------|------|------|
| Intersection Delay, s/veh  | 29.7  |       |       |       |      |      |      |      |      |      |      |      |
| Intersection LOS           | D     |       |       |       |      |      |      |      |      |      |      |      |
| Movement                   | EBL   | EBT   | EBR   | WBL   | WBT  | WBR  | NBL  | NBT  | NBR  | SBL  | SBT  | SBR  |
| Lane Configurations        |       | ↔     |       |       | ↔    |      |      | ↔    |      |      | ↔    |      |
| Traffic Vol, veh/h         | 255   | 50    | 20    | 0     | 5    | 40   | 2    | 390  | 55   | 70   | 345  | 2    |
| Future Vol, veh/h          | 255   | 50    | 20    | 0     | 5    | 40   | 2    | 390  | 55   | 70   | 345  | 2    |
| Peak Hour Factor           | 0.92  | 0.92  | 0.92  | 0.92  | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Heavy Vehicles, %          | 0     | 0     | 0     | 0     | 0    | 0    | 1    | 1    | 1    | 0    | 0    | 0    |
| Mvmt Flow                  | 277   | 54    | 22    | 0     | 5    | 43   | 2    | 424  | 60   | 76   | 375  | 2    |
| Number of Lanes            | 0     | 1     | 0     | 0     | 1    | 0    | 0    | 1    | 0    | 0    | 1    | 0    |
| Approach                   | EB    |       |       | WB    |      |      | NB   |      |      | SB   |      |      |
| Opposing Approach          | WB    |       |       | EB    |      |      | SB   |      |      | NB   |      |      |
| Opposing Lanes             | 1     |       |       | 1     |      |      | 1    |      |      | 1    |      |      |
| Conflicting Approach Left  | SB    |       |       | NB    |      |      | EB   |      |      | WB   |      |      |
| Conflicting Lanes Left     | 1     |       |       | 1     |      |      | 1    |      |      | 1    |      |      |
| Conflicting Approach Right | NB    |       |       | SB    |      |      | WB   |      |      | EB   |      |      |
| Conflicting Lanes Right    | 1     |       |       | 1     |      |      | 1    |      |      | 1    |      |      |
| HCM Control Delay          | 23.7  |       |       | 11.5  |      |      | 34.7 |      |      | 30.9 |      |      |
| HCM LOS                    | C     |       |       | B     |      |      | D    |      |      | D    |      |      |
| Lane                       | NBLn1 | EBLn1 | WBLn1 | SBLn1 |      |      |      |      |      |      |      |      |
| Vol Left, %                | 0%    | 78%   | 0%    | 17%   |      |      |      |      |      |      |      |      |
| Vol Thru, %                | 87%   | 15%   | 11%   | 83%   |      |      |      |      |      |      |      |      |
| Vol Right, %               | 12%   | 6%    | 89%   | 0%    |      |      |      |      |      |      |      |      |
| Sign Control               | Stop  | Stop  | Stop  | Stop  |      |      |      |      |      |      |      |      |
| Traffic Vol by Lane        | 447   | 325   | 45    | 417   |      |      |      |      |      |      |      |      |
| LT Vol                     | 2     | 255   | 0     | 70    |      |      |      |      |      |      |      |      |
| Through Vol                | 390   | 50    | 5     | 345   |      |      |      |      |      |      |      |      |
| RT Vol                     | 55    | 20    | 40    | 2     |      |      |      |      |      |      |      |      |
| Lane Flow Rate             | 486   | 353   | 49    | 453   |      |      |      |      |      |      |      |      |
| Geometry Grp               | 1     | 1     | 1     | 1     |      |      |      |      |      |      |      |      |
| Degree of Util (X)         | 0.845 | 0.681 | 0.103 | 0.805 |      |      |      |      |      |      |      |      |
| Departure Headway (Hd)     | 6.26  | 6.942 | 7.612 | 6.397 |      |      |      |      |      |      |      |      |
| Convergence, Y/N           | Yes   | Yes   | Yes   | Yes   |      |      |      |      |      |      |      |      |
| Cap                        | 578   | 519   | 473   | 562   |      |      |      |      |      |      |      |      |
| Service Time               | 4.331 | 5.015 | 5.612 | 4.47  |      |      |      |      |      |      |      |      |
| HCM Lane V/C Ratio         | 0.841 | 0.68  | 0.104 | 0.806 |      |      |      |      |      |      |      |      |
| HCM Control Delay          | 34.7  | 23.7  | 11.5  | 30.9  |      |      |      |      |      |      |      |      |
| HCM Lane LOS               | D     | C     | B     | D     |      |      |      |      |      |      |      |      |
| HCM 95th-tile Q            | 9     | 5.1   | 0.3   | 7.8   |      |      |      |      |      |      |      |      |

12239.00 :: Needham Street  
3: Chestnut Street & Elliot Street

2025 Build Conditions - with Shuttle Service  
Timing Plan: Weekday Morning

| Lane Group              | EBL   | EBT   | EBR  | WBL   | WBT   | WBR  | NBL   | NBT   | NBR  | SBL   | SBT   | SBR  | Ø3   |
|-------------------------|-------|-------|------|-------|-------|------|-------|-------|------|-------|-------|------|------|
| Lane Configurations     | ↔     |       | ↔    | ↔     | ↔     | ↔    | ↔     | ↔     | ↔    | ↔     | ↔     | ↔    | ↔    |
| Traffic Volume (vph)    | 370   | 270   | 40   | 5     | 55    | 35   | 40    | 195   | 5    | 30    | 275   | 170  |      |
| Future Volume (vph)     | 370   | 270   | 40   | 5     | 55    | 35   | 40    | 195   | 5    | 30    | 275   | 170  |      |
| Ideal Flow (vphpl)      | 1900  | 1900  | 1900 | 1900  | 1900  | 1900 | 1900  | 1900  | 1900 | 1900  | 1900  | 1900 |      |
| Satd. Flow (prot)       | 0     | 1832  | 0    | 0     | 1801  | 0    | 0     | 1842  | 0    | 0     | 1790  | 0    |      |
| Fit Permitted           |       | 0.774 |      |       | 0.971 |      |       | 0.825 |      |       | 0.965 |      |      |
| Satd. Flow (perm)       | 0     | 1457  | 0    | 0     | 1753  | 0    | 0     | 1531  | 0    | 0     | 1734  | 0    |      |
| Right Turn on Red       | Yes   |       | Yes  |       | Yes   |      | Yes   |       | Yes  |       | Yes   |      |      |
| Satd. Flow (RTOR)       | 4     |       | 36   |       | 1     |      | 34    |       | 5    |       | 5     |      |      |
| Link Speed (mph)        | 30    |       | 30   |       | 30    |      | 30    |       | 30   |       | 30    |      |      |
| Link Distance (ft)      | 764   |       | 972  |       | 2055  |      | 1553  |       | 762  |       | 762   |      |      |
| Travel Time (s)         | 17.4  |       | 22.1 |       | 46.7  |      | 35.3  |       | 17.3 |       | 17.3  |      |      |
| Confl. Peds. (#/hr)     | 1     |       | 1    |       | 1     |      | 1     |       | 1    |       | 1     |      |      |
| Peak Hour Factor        | 0.92  | 0.92  | 0.92 | 0.92  | 0.92  | 0.92 | 0.92  | 0.92  | 0.92 | 0.92  | 0.92  | 0.92 |      |
| Heavy Vehicles (%)      | 0%    | 0%    | 0%   | 0%    | 0%    | 0%   | 2%    | 2%    | 2%   | 0%    | 0%    | 0%   |      |
| Shared Lane Traffic (%) |       |       |      |       |       |      |       |       |      |       |       |      |      |
| Lane Group Flow (vph)   | 0     | 738   | 0    | 0     | 103   | 0    | 0     | 260   | 0    | 0     | 517   | 0    |      |
| Turn Type               | Perm  | NA    | Perm | NA    | NA    | Perm | NA    | NA    | Perm | NA    | NA    | NA   |      |
| Protected Phases        |       |       |      |       |       |      |       |       |      |       |       |      |      |
| Permitted Phases        | 1     | 1     |      | 1     | 1     |      | 2     | 2     |      | 2     | 2     |      | 3    |
| Detector Phase          | 1     | 1     |      | 1     | 1     |      | 2     | 2     |      | 2     | 2     |      |      |
| Switch Phase            |       |       |      |       |       |      |       |       |      |       |       |      |      |
| Minimum Initial (s)     | 6.0   | 6.0   |      | 6.0   | 6.0   |      | 6.0   | 6.0   |      | 6.0   | 6.0   |      | 4.0  |
| Minimum Split (s)       | 11.0  | 11.0  |      | 11.0  | 11.0  |      | 11.0  | 11.0  |      | 11.0  | 11.0  |      | 19.0 |
| Total Split (s)         | 35.0  | 35.0  |      | 35.0  | 35.0  |      | 35.0  | 35.0  |      | 35.0  | 35.0  |      | 19.0 |
| Total Split (%)         | 39.3% | 39.3% |      | 39.3% | 39.3% |      | 39.3% | 39.3% |      | 39.3% | 39.3% |      | 21%  |
| Yellow Time (s)         | 3.0   | 3.0   |      | 3.0   | 3.0   |      | 3.0   | 3.0   |      | 3.0   | 3.0   |      | 3.0  |
| All-Red Time (s)        | 2.0   | 2.0   |      | 2.0   | 2.0   |      | 2.0   | 2.0   |      | 2.0   | 2.0   |      | 1.0  |
| Lost Time Adjust (s)    |       |       |      |       |       |      |       |       |      |       |       |      |      |
| Total Lost Time (s)     |       |       |      |       |       |      |       |       |      |       |       |      |      |
| Lead/Lag                | Lead  | Lead  |      | Lead  | Lead  |      | Lag   | Lag   |      | Lag   | Lag   |      |      |
| Lead-Lag Optimize?      |       |       |      |       |       |      |       |       |      |       |       |      |      |
| Recall Mode             | None  | None  |      | None  | None  |      | None  | None  |      | None  | None  |      | None |
| Act Effect Green (s)    | 30.8  | 30.8  |      | 30.8  | 30.8  |      | 30.8  | 30.8  |      | 30.8  | 30.8  |      | None |
| Actuated g/C Ratio      | 0.45  | 0.45  |      | 0.45  | 0.45  |      | 0.45  | 0.45  |      | 0.45  | 0.45  |      | None |
| v/c Ratio               | 1.11  | 1.11  |      | 1.11  | 1.11  |      | 1.11  | 1.11  |      | 1.11  | 1.11  |      | None |
| Control Delay           | 92.7  | 92.7  |      | 92.7  | 92.7  |      | 92.7  | 92.7  |      | 92.7  | 92.7  |      | None |
| Queue Delay             | 0.0   | 0.0   |      | 0.0   | 0.0   |      | 0.0   | 0.0   |      | 0.0   | 0.0   |      | None |
| Total Delay             | 92.7  | 92.7  |      | 92.7  | 92.7  |      | 92.7  | 92.7  |      | 92.7  | 92.7  |      | None |
| LOS                     | F     | F     |      | F     | F     |      | F     | F     |      | F     | F     |      | None |
| Approach Delay          | 92.7  | 92.7  |      | 92.7  | 92.7  |      | 92.7  | 92.7  |      | 92.7  | 92.7  |      | None |
| Approach LOS            | F     | F     |      | F     | F     |      | F     | F     |      | F     | F     |      | None |
| Queue Length 50th (ft)  | ~333  | ~333  |      | ~333  | ~333  |      | ~333  | ~333  |      | ~333  | ~333  |      | None |
| Queue Length 95th (ft)  | #805  | #805  |      | #805  | #805  |      | #805  | #805  |      | #805  | #805  |      | None |
| Internal Link Dist (ft) | 684   | 684   |      | 684   | 684   |      | 684   | 684   |      | 684   | 684   |      | None |
| Turn Bay Length (ft)    |       |       |      |       |       |      |       |       |      |       |       |      | None |
| Base Capacity (vph)     | 665   | 665   |      | 665   | 665   |      | 665   | 665   |      | 665   | 665   |      | None |
| Starvation Cap Reductn  | 0     | 0     |      | 0     | 0     |      | 0     | 0     |      | 0     | 0     |      | None |
| Spillback Cap Reductn   | 0     | 0     |      | 0     | 0     |      | 0     | 0     |      | 0     | 0     |      | None |
| Storage Cap Reductn     | 0     | 0     |      | 0     | 0     |      | 0     | 0     |      | 0     | 0     |      | None |
| Reduced v/c Ratio       | 1.11  | 1.11  |      | 1.11  | 1.11  |      | 1.11  | 1.11  |      | 1.11  | 1.11  |      | None |

Intersection Summary

|                                                                 |                        |
|-----------------------------------------------------------------|------------------------|
| Area Type:                                                      | Other                  |
| Cycle Length: 89                                                |                        |
| Actuated Cycle Length: 67.7                                     |                        |
| Natural Cycle: 130                                              |                        |
| Control Type: Actuated-Uncoordinated                            |                        |
| Maximum v/c Ratio: 1.11                                         |                        |
| Intersection Signal Delay: 56.7                                 | Intersection LOS: E    |
| Intersection Capacity Utilization 81.5%                         | ICU Level of Service D |
| Analysis Period (min) 15                                        |                        |
| ~ Volume exceeds capacity, queue is theoretically infinite.     |                        |
| # Queue shown is maximum after two cycles.                      |                        |
| # 95th percentile volume exceeds capacity, queue may be longer. |                        |
| Queue shown is maximum after two cycles.                        |                        |

Splits and Phases: 3: Chestnut Street & Elliot Street



Lanes, Volumes, Timings  
VHB/MSD

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07/03/2018

12239.00 :: Needham Street  
4: Oak Street & Chestnut Street

2025 Build Conditions - with Shuttle Service  
Timing Plan: Weekday Morning

| Lane Group              | EBL   | EBT   | EBR  | WBL   | WBT   | WBR  | NBL   | NBT   | NBR  | SBL   | SBT   | SBR  | Ø3   |
|-------------------------|-------|-------|------|-------|-------|------|-------|-------|------|-------|-------|------|------|
| Lane Configurations     | ↔     |       |      |       | ↔     |      |       | ↔     |      | ↔     | ↔     |      |      |
| Traffic Volume (vph)    | 15    | 25    | 355  | 35    | 15    | 5    | 295   | 130   | 40   | 2     | 45    | 5    |      |
| Future Volume (vph)     | 15    | 25    | 355  | 35    | 15    | 5    | 295   | 130   | 40   | 2     | 45    | 5    |      |
| Ideal Flow (vphpl)      | 1900  | 1900  | 1900 | 1900  | 1900  | 1900 | 1900  | 1900  | 1900 | 1900  | 1900  | 1900 |      |
| Satd. Flow (prot)       | 0     | 1667  | 0    | 0     | 1818  | 0    | 0     | 1798  | 0    | 0     | 1832  | 0    |      |
| Fit Permitted           |       | 0.987 |      |       | 0.352 |      |       | 0.774 |      |       | 0.987 |      |      |
| Satd. Flow (perm)       | 0     | 1648  |      | 0     | 660   | 0    | 0     | 1428  | 0    | 0     | 1811  | 0    |      |
| Right Turn on Red       |       |       | Yes  |       |       | Yes  |       |       | Yes  |       |       | Yes  |      |
| Satd. Flow (RTOR)       |       | 386   |      |       | 5     |      |       | 5     |      |       | 5     |      |      |
| Link Speed (mph)        |       | 30    |      |       | 30    |      |       | 30    |      |       | 30    |      |      |
| Link Distance (ft)      |       | 2055  |      |       | 492   |      |       | 226   |      |       | 762   |      |      |
| Travel Time (s)         |       | 46.7  |      |       | 11.2  |      |       | 5.1   |      |       | 17.3  |      |      |
| Confl. Peds. (#/hr)     | 1     |       |      |       |       | 1    | 6     |       | 6    | 6     |       |      |      |
| Confl. Bikes (#/hr)     |       |       |      |       |       |      |       |       |      |       |       |      | 1    |
| Peak Hour Factor        | 0.92  | 0.92  | 0.92 | 0.92  | 0.92  | 0.92 | 0.92  | 0.92  | 0.92 | 0.92  | 0.92  | 0.92 |      |
| Heavy Vehicles (%)      | 0%    | 0%    | 0%   | 0%    | 0%    | 0%   | 1%    | 1%    | 1%   | 2%    | 2%    | 2%   |      |
| Shared Lane Traffic (%) |       |       |      |       |       |      |       |       |      |       |       |      |      |
| Lane Group Flow (vph)   | 0     | 429   | 0    | 0     | 59    | 0    | 0     | 505   | 0    | 0     | 56    | 0    |      |
| Turn Type               | Perm  | NA    |      | Perm  | NA    |      | Perm  | NA    |      | Perm  | NA    |      |      |
| Protected Phases        |       | 1     |      |       | 1     |      |       | 2     |      |       | 2     |      | 3    |
| Permitted Phases        | 1     |       |      | 1     |       |      | 2     |       |      | 2     |       |      |      |
| Detector Phase          | 1     | 1     |      | 1     | 1     |      | 2     | 2     |      | 2     | 2     |      |      |
| Switch Phase            |       |       |      |       |       |      |       |       |      |       |       |      |      |
| Minimum Initial (s)     | 8.0   | 8.0   |      | 8.0   | 8.0   |      | 8.0   | 8.0   |      | 8.0   | 8.0   |      | 8.0  |
| Minimum Split (s)       | 13.0  | 13.0  |      | 13.0  | 13.0  |      | 14.0  | 14.0  |      | 14.0  | 14.0  |      | 18.0 |
| Total Split (s)         | 35.0  | 35.0  |      | 35.0  | 35.0  |      | 36.0  | 36.0  |      | 36.0  | 36.0  |      | 25.0 |
| Total Split (%)         | 36.5% | 36.5% |      | 36.5% | 36.5% |      | 37.5% | 37.5% |      | 37.5% | 37.5% |      | 26%  |
| Yellow Time (s)         | 4.0   | 4.0   |      | 4.0   | 4.0   |      | 4.0   | 4.0   |      | 4.0   | 4.0   |      | 4.0  |
| All-Red Time (s)        | 1.0   | 1.0   |      | 1.0   | 1.0   |      | 2.0   | 2.0   |      | 2.0   | 2.0   |      | 1.0  |
| Lost Time Adjust (s)    |       | 0.0   |      |       | 0.0   |      |       | 0.0   |      |       | 0.0   |      |      |
| Total Lost Time (s)     |       | 5.0   |      |       | 5.0   |      |       | 6.0   |      |       | 6.0   |      |      |
| Lead/Lag                | Lead  | Lead  |      | Lead  | Lead  |      | Lag   | Lag   |      | Lag   | Lag   |      |      |
| Lead-Lag Optimize?      |       |       |      |       |       |      |       |       |      |       |       |      |      |
| Recall Mode             | Min   | Min   |      | Min   | Min   |      | Min   | Min   |      | Min   | Min   |      | None |
| Act Effect Green (s)    | 11.6  |       |      | 11.6  |       |      | 31.0  |       |      | 31.0  |       |      |      |
| Actuated g/C Ratio      | 0.20  |       |      | 0.20  |       |      | 0.55  |       |      | 0.55  |       |      |      |
| v/c Ratio               | 0.67  |       |      | 0.42  |       |      | 0.64  |       |      | 0.64  |       |      | 0.06 |
| Control Delay           | 9.6   |       |      | 29.4  |       |      | 18.2  |       |      | 18.2  |       |      | 9.4  |
| Queue Delay             | 0.0   | 0.0   |      | 0.0   | 0.0   |      | 0.0   | 0.0   |      | 0.0   | 0.0   |      |      |
| Total Delay             | 9.6   |       |      | 29.4  |       |      | 18.2  |       |      | 18.2  |       |      | 9.4  |
| LOS                     | A     | A     |      | C     |       |      | B     |       |      | A     | A     |      |      |
| Approach Delay          | 9.6   |       |      | 29.4  |       |      | 18.2  |       |      | 18.2  |       |      | 9.4  |
| Approach LOS            | A     | A     |      | C     |       |      | B     |       |      | A     | A     |      |      |
| Queue Length 50th (ft)  | 11    |       |      | 14    |       |      | 78    |       |      | 5     |       |      |      |
| Queue Length 95th (ft)  | 93    |       |      | 57    |       |      | #436  |       |      | 39    |       |      |      |
| Internal Link Dist (ft) | 1975  |       |      | 412   |       |      | 146   |       |      | 682   |       |      |      |
| Turn Bay Length (ft)    |       |       |      |       |       |      |       |       |      |       |       |      |      |
| Base Capacity (vph)     | 1078  |       |      | 364   |       |      | 785   |       |      | 995   |       |      |      |
| Starvation Cap Reductn  | 0     |       |      | 0     |       |      | 0     |       |      | 0     |       |      |      |
| Spillback Cap Reductn   | 0     |       |      | 0     |       |      | 0     |       |      | 0     |       |      |      |
| Storage Cap Reductn     | 0     |       |      | 0     |       |      | 0     |       |      | 0     |       |      |      |
| Reduced v/c Ratio       | 0.40  |       |      | 0.16  |       |      | 0.64  |       |      | 0.06  |       |      |      |

12239.00 :: Needham Street  
5: Oak Street & Site Driveway

2025 Build Conditions - with Shuttle Service  
Timing Plan: Weekday Morning

| Intersection             |        |       |        |       |       |      |
|--------------------------|--------|-------|--------|-------|-------|------|
| Int Delay, s/veh         | 1.3    |       |        |       |       |      |
| Movement                 | WBL    | WBR   | NBT    | NBR   | SBL   | SBT  |
| Lane Configurations      | W      |       |        |       |       | W    |
| Traffic Vol, veh/h       | 30     | 25    | 440    | 35    | 30    | 405  |
| Future Vol, veh/h        | 30     | 25    | 440    | 35    | 30    | 405  |
| Conflicting Peds, #/hr   | 4      | 0     | 0      | 3     | 3     | 0    |
| Sign Control             | Stop   | Stop  | Free   | Free  | Free  | Free |
| RT Channelized           | -      | None  | -      | None  | -     | None |
| Storage Length           | 0      | -     | -      | -     | -     | -    |
| Veh in Median Storage, # | 0      | -     | 0      | -     | -     | 0    |
| Grade, %                 | 0      | -     | 0      | -     | -     | 0    |
| Peak Hour Factor         | 92     | 92    | 92     | 92    | 92    | 92   |
| Heavy Vehicles, %        | 0      | 0     | 1      | 1     | 1     | 1    |
| Mvmt Flow                | 33     | 27    | 478    | 38    | 33    | 440  |
| Major/Minor              |        |       |        |       |       |      |
| Minor1                   | Major1 |       | Major2 |       |       |      |
| Conflicting Flow All     | 1009   | 500   | 0      | 0     | 519   | 0    |
| Stage 1                  | 500    | -     | -      | -     | -     | -    |
| Stage 2                  | 509    | -     | -      | -     | -     | -    |
| Critical Hdwy            | 6.4    | 6.2   | -      | -     | 4.11  | -    |
| Critical Hdwy Stg 1      | 5.4    | -     | -      | -     | -     | -    |
| Critical Hdwy Stg 2      | 5.4    | -     | -      | -     | -     | -    |
| Follow-up Hdwy           | 3.5    | 3.3   | -      | -     | 2.209 | -    |
| Pot Cap-1 Maneuver       | 269    | 575   | -      | -     | 1052  | -    |
| Stage 1                  | 613    | -     | -      | -     | -     | -    |
| Stage 2                  | 608    | -     | -      | -     | -     | -    |
| Platoon blocked, %       | -      | -     | -      | -     | -     | -    |
| Mov Cap-1 Maneuver       | 256    | 574   | -      | -     | 1052  | -    |
| Mov Cap-2 Maneuver       | 256    | -     | -      | -     | -     | -    |
| Stage 1                  | 611    | -     | -      | -     | -     | -    |
| Stage 2                  | 581    | -     | -      | -     | -     | -    |
| Approach                 |        |       |        |       |       |      |
| WB                       | NB     |       | SB     |       |       |      |
| HCM Control Delay, s     | 17.7   | 0     | 0.6    |       |       |      |
| HCM LOS                  | C      |       |        |       |       |      |
| Minor Lane/Major Mvmt    |        |       |        |       |       |      |
| NBT                      | NBR    | WBLn1 | SBL    | SBT   |       |      |
| Capacity (veh/h)         | -      | -     | 342    | 1052  | -     | -    |
| HCM Lane V/C Ratio       | -      | -     | 0.175  | 0.031 | -     | -    |
| HCM Control Delay (s)    | -      | -     | 17.7   | 8.5   | 0     | -    |
| HCM Lane LOS             | -      | -     | C      | A     | A     | -    |
| HCM 95th %tile Q(veh)    | -      | -     | 0.6    | 0.1   | -     | -    |

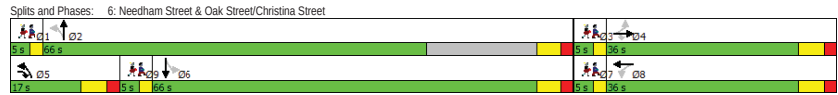
12239.00 :: Needham Street  
6: Needham Street & Oak Street/Christina Street

2025 Build Conditions - with Shuttle Service  
Timing Plan: Weekday Morning

| Lane Group                                                      | EBL                    | EBT   | EBR   | WBL   | WBT   | WBR  | NBL   | NBT   | NBR  | SBL   | SBT   | SBR  | Ø1   | Ø3   | Ø7   | Ø9   |
|-----------------------------------------------------------------|------------------------|-------|-------|-------|-------|------|-------|-------|------|-------|-------|------|------|------|------|------|
| Lane Configurations                                             |                        | W     |       | W     | W     |      | W     | W     |      | W     | W     |      |      |      |      |      |
| Traffic Volume (vph)                                            | 140                    | 125   | 170   | 130   | 200   | 25   | 160   | 805   | 70   | 30    | 710   | 100  |      |      |      |      |
| Future Volume (vph)                                             | 140                    | 125   | 170   | 130   | 200   | 25   | 160   | 805   | 70   | 30    | 710   | 100  |      |      |      |      |
| Ideal Flow (vphpl)                                              | 1900                   | 1900  | 1900  | 1900  | 1900  | 1900 | 1900  | 1900  | 1900 | 1900  | 1900  | 1900 |      |      |      |      |
| Storage Length (ft)                                             | 0                      | 100   | 200   | 50    | 0     | 1    | 0     | 220   | 0    | 220   | 0     | 0    |      |      |      |      |
| Storage Lanes                                                   | 0                      | 1     | 1     | 0     | 1     | 0    | 1     | 0     | 1    | 0     | 1     | 0    |      |      |      |      |
| Taper Length (ft)                                               | 25                     |       | 25    |       | 25    |      | 25    |       | 25   |       | 25    |      |      |      |      |      |
| Satd. Flow (prot)                                               | 0                      | 1832  | 1599  | 1805  | 1858  | 0    | 1787  | 1854  | 0    | 1770  | 1821  | 0    |      |      |      |      |
| Flt Permitted                                                   |                        | 0.462 |       | 0.412 |       |      | 0.058 |       |      | 0.158 |       |      |      |      |      |      |
| Satd. Flow (perm)                                               | 0                      | 863   | 1599  | 783   | 1858  | 0    | 109   | 1854  | 0    | 294   | 1821  | 0    |      |      |      |      |
| Right Turn on Red                                               |                        | Yes   |       | Yes   |       |      | Yes   |       | Yes  |       | Yes   |      |      |      |      |      |
| Satd. Flow (RTOR)                                               |                        | 141   |       | 5     |       |      | 6     |       | 7    |       | 7     |      |      |      |      |      |
| Link Speed (mph)                                                | 30                     |       | 30    |       | 30    |      | 30    |       | 30   |       | 30    |      |      |      |      |      |
| Link Distance (ft)                                              | 1238                   |       | 516   |       | 754   |      | 369   |       | 369  |       | 369   |      |      |      |      |      |
| Travel Time (s)                                                 | 28.1                   |       | 11.7  |       | 17.1  |      | 8.4   |       | 8.4  |       | 8.4   |      |      |      |      |      |
| Confl. Peds. (#/hr)                                             | 6                      |       | 0.92  |       | 0.92  |      | 0.92  |       | 0.92 |       | 0.92  |      |      |      |      |      |
| Peak Hour Factor                                                | 0.92                   | 0.92  | 0.92  | 0.92  | 0.92  | 0.92 | 0.92  | 0.92  | 0.92 | 0.92  | 0.92  | 0.92 |      |      |      |      |
| Heavy Vehicles (%)                                              | 1%                     | 1%    | 1%    | 0%    | 0%    | 0%   | 1%    | 1%    | 1%   | 2%    | 2%    | 2%   |      |      |      |      |
| Shared Lane Traffic (%)                                         |                        |       |       |       |       |      |       |       |      |       |       |      |      |      |      |      |
| Lane Group Flow (vph)                                           | 0                      | 288   | 185   | 141   | 244   | 0    | 174   | 951   | 0    | 33    | 881   | 0    |      |      |      |      |
| Turn Type                                                       | Perm                   | NA    | pm+ov | Perm  | NA    |      | pm+pt | NA    |      | Perm  | NA    |      |      |      |      |      |
| Protected Phases                                                | 4                      | 4     | 5     | 8     | 8     |      | 5     | 2     |      | 6     | 6     |      | 1    | 3    | 7    | 9    |
| Permitted Phases                                                | 4                      | 4     | 5     | 8     | 8     |      | 5     | 2     |      | 6     | 6     |      |      |      |      |      |
| Detector Phase                                                  | 4                      | 4     | 5     | 8     | 8     |      | 5     | 2     |      | 6     | 6     |      |      |      |      |      |
| Switch Phase                                                    |                        |       |       |       |       |      |       |       |      |       |       |      |      |      |      |      |
| Minimum Initial (s)                                             | 6.0                    | 6.0   | 6.0   | 6.0   | 6.0   |      | 6.0   | 15.0  |      | 15.0  | 15.0  |      | 3.0  | 3.0  | 3.0  | 3.0  |
| Minimum Split (s)                                               | 22.0                   | 22.0  | 13.0  | 26.0  | 26.0  |      | 13.0  | 29.0  |      | 28.0  | 28.0  |      | 5.0  | 5.0  | 5.0  | 5.0  |
| Total Split (s)                                                 | 36.0                   | 36.0  | 17.0  | 36.0  | 36.0  |      | 17.0  | 66.0  |      | 66.0  | 66.0  |      | 5.0  | 5.0  | 5.0  | 5.0  |
| Total Split (%)                                                 | 27.9%                  | 27.9% | 13.2% | 27.9% | 27.9% |      | 13.2% | 51.2% |      | 51.2% | 51.2% |      | 4%   | 4%   | 4%   | 4%   |
| Yellow Time (s)                                                 | 4.0                    | 4.0   | 4.0   | 4.0   | 4.0   |      | 4.0   | 4.0   |      | 4.0   | 4.0   |      | 2.0  | 2.0  | 2.0  | 2.0  |
| All-Red Time (s)                                                | 2.0                    | 2.0   | 2.0   | 2.0   | 2.0   |      | 2.0   | 2.0   |      | 2.0   | 2.0   |      | 0.0  | 0.0  | 0.0  | 0.0  |
| Lost Time Adjust (s)                                            | 0.0                    | 0.0   | 0.0   | 0.0   | 0.0   |      | 0.0   | 0.0   |      | 0.0   | 0.0   |      |      |      |      |      |
| Total Lost Time (s)                                             | 6.0                    | 6.0   | 6.0   | 6.0   | 6.0   |      | 6.0   | 6.0   |      | 6.0   | 6.0   |      |      |      |      |      |
| Lead/Lag                                                        | Lag                    | Lag   | Lead  | Lag   | Lag   |      | Lead  | Lag   |      |       |       |      | Lead | Lead | Lead | Lag  |
| Lead-Lag Optimize?                                              |                        |       |       |       |       |      |       |       |      |       |       |      |      |      |      |      |
| Recall Mode                                                     | None                   | None  | None  | None  | None  |      | None  | None  |      | None  | None  |      | None | None | None | None |
| Act Effct Green (s)                                             | 31.0                   | 47.8  | 30.0  | 30.0  | 77.8  |      | 76.9  | 60.1  |      | 60.1  | 60.1  |      |      |      |      |      |
| Actuated g/C Ratio                                              | 0.26                   | 0.40  | 0.25  | 0.25  | 0.64  |      | 0.64  | 0.50  |      | 0.50  | 0.50  |      |      |      |      |      |
| v/c Ratio                                                       | 1.30                   | 0.26  | 0.73  | 0.52  | 0.79  |      | 0.81  | 0.23  |      | 0.23  | 0.97  |      |      |      |      |      |
| Control Delay                                                   | 203.0                  | 7.9   | 64.7  | 43.8  | 52.7  |      | 23.6  | 23.6  |      | 23.6  | 53.5  |      |      |      |      |      |
| Queue Delay                                                     | 0.0                    | 0.0   | 0.0   | 0.0   | 0.0   |      | 0.0   | 0.0   |      | 0.0   | 7.1   |      |      |      |      |      |
| Total Delay                                                     | 203.0                  | 7.9   | 64.7  | 43.8  | 52.7  |      | 23.6  | 23.6  |      | 23.6  | 60.6  |      |      |      |      |      |
| LOS                                                             | F                      | A     | E     | D     | D     |      | C     | C     |      | C     | E     |      |      |      |      |      |
| Approach Delay                                                  | 126.7                  |       | 51.4  |       | 28.1  |      |       | 59.3  |      |       |       |      |      |      |      |      |
| Approach LOS                                                    | F                      |       | D     |       | C     |      |       | E     |      |       |       |      |      |      |      |      |
| Queue Length 50th (ft)                                          | ~286                   | 21    | 99    | 158   | 81    |      | 485   | 14    |      | 623   |       |      |      |      |      |      |
| Queue Length 95th (ft)                                          | #478                   | 71    | #224  | 267   | #215  |      | 854   | 44    |      | #1043 |       |      |      |      |      |      |
| Internal Link Dist (ft)                                         | 1158                   |       | 436   |       | 674   |      |       | 289   |      |       |       |      |      |      |      |      |
| Turn Bay Length (ft)                                            |                        | 100   | 200   |       |       |      |       | 220   |      |       |       |      |      |      |      |      |
| Base Capacity (vph)                                             | 221                    | 720   | 194   | 465   | 223   |      | 1185  | 146   |      | 909   |       |      |      |      |      |      |
| Starvation Cap Reductn                                          | 0                      | 0     | 0     | 0     | 0     |      | 0     | 0     |      | 0     | 32    |      |      |      |      |      |
| Spillback Cap Reductn                                           | 0                      | 0     | 0     | 0     | 0     |      | 0     | 0     |      | 0     | 0     |      |      |      |      |      |
| Storage Cap Reductn                                             | 0                      | 0     | 0     | 0     | 0     |      | 0     | 0     |      | 0     | 0     |      |      |      |      |      |
| Reduced v/c Ratio                                               | 1.30                   | 0.26  | 0.73  | 0.52  | 0.78  |      | 0.80  | 0.23  |      | 1.00  |       |      |      |      |      |      |
| Intersection Summary                                            |                        |       |       |       |       |      |       |       |      |       |       |      |      |      |      |      |
| Area Type:                                                      | Other                  |       |       |       |       |      |       |       |      |       |       |      |      |      |      |      |
| Cycle Length: 129                                               |                        |       |       |       |       |      |       |       |      |       |       |      |      |      |      |      |
| Actuated Cycle Length: 120.8                                    |                        |       |       |       |       |      |       |       |      |       |       |      |      |      |      |      |
| Natural Cycle: 140                                              |                        |       |       |       |       |      |       |       |      |       |       |      |      |      |      |      |
| Control Type: Actuated-Uncoordinated                            |                        |       |       |       |       |      |       |       |      |       |       |      |      |      |      |      |
| Maximum v/c Ratio: 1.30                                         |                        |       |       |       |       |      |       |       |      |       |       |      |      |      |      |      |
| Intersection Signal Delay: 57.2                                 | Intersection LOS: E    |       |       |       |       |      |       |       |      |       |       |      |      |      |      |      |
| Intersection Capacity Utilization 105.6%                        | ICU Level of Service G |       |       |       |       |      |       |       |      |       |       |      |      |      |      |      |
| Analysis Period (min): 15                                       |                        |       |       |       |       |      |       |       |      |       |       |      |      |      |      |      |
| - Volume exceeds capacity, queue is theoretically infinite.     |                        |       |       |       |       |      |       |       |      |       |       |      |      |      |      |      |
| - Queue shown is maximum after two cycles.                      |                        |       |       |       |       |      |       |       |      |       |       |      |      |      |      |      |
| # 95th percentile volume exceeds capacity, queue may be longer. |                        |       |       |       |       |      |       |       |      |       |       |      |      |      |      |      |
| - Queue shown is maximum after two cycles.                      |                        |       |       |       |       |      |       |       |      |       |       |      |      |      |      |      |

12239.00 :: Needham Street  
6: Needham Street & Oak Street/Christina Street

2025 Build Conditions - with Shuttle Service  
Timing Plan: Weekday Morning



12239.00 :: Needham Street  
7: Needham Street & South Site Driveway

2025 Build Conditions - with Shuttle Service  
Timing Plan: Weekday Morning

| Intersection             |      |      |      |      |      |      |
|--------------------------|------|------|------|------|------|------|
| Int Delay, s/veh         | 1    |      |      |      |      |      |
| Movement                 | EBL  | EBR  | NBL  | NBT  | SBT  | SBR  |
| Lane Configurations      | ↔    | ↔    | ↔    | ↔    | ↔    | ↔    |
| Traffic Vol, veh/h       | 10   | 45   | 20   | 950  | 795  | 20   |
| Future Vol, veh/h        | 10   | 45   | 20   | 950  | 795  | 20   |
| Conflicting Peds, #/hr   | 0    | 0    | 2    | 0    | 0    | 2    |
| Sign Control             | Stop | Stop | Free | Free | Free | Free |
| RT Channelized           | -    | None | -    | None | -    | None |
| Storage Length           | 0    | -    | 50   | -    | -    | -    |
| Veh in Median Storage, # | 0    | -    | -    | 0    | 0    | -    |
| Grade, %                 | 0    | -    | -    | 0    | 0    | -    |
| Peak Hour Factor         | 92   | 92   | 92   | 92   | 92   | 92   |
| Heavy Vehicles, %        | 0    | 0    | 1    | 1    | 2    | 2    |
| Mvmt Flow                | 11   | 49   | 22   | 1033 | 864  | 22   |

| Major/Minor          | Minor2 | Major1 |       | Major2 |   |
|----------------------|--------|--------|-------|--------|---|
| Conflicting Flow All | 1953   | 877    | 888   | 0      | 0 |
| Stage 1              | 877    | -      | -     | -      | - |
| Stage 2              | 1076   | -      | -     | -      | - |
| Critical Hdwy        | 6.4    | 6.2    | 4.11  | -      | - |
| Critical Hdwy Stg 1  | 5.4    | -      | -     | -      | - |
| Critical Hdwy Stg 2  | 5.4    | -      | -     | -      | - |
| Follow-up Hdwy       | 3.5    | 3.3    | 2.209 | -      | - |
| Pot Cap-1 Maneuver   | 71     | 351    | 767   | -      | - |
| Stage 1              | 410    | -      | -     | -      | - |
| Stage 2              | 330    | -      | -     | -      | - |
| Platoon blocked, %   | -      | -      | -     | -      | - |
| Mov Cap-1 Maneuver   | 69     | 350    | 767   | -      | - |
| Mov Cap-2 Maneuver   | 69     | -      | -     | -      | - |
| Stage 1              | 409    | -      | -     | -      | - |
| Stage 2              | 320    | -      | -     | -      | - |

| Approach             | EB   | NB  | SB |
|----------------------|------|-----|----|
| HCM Control Delay, s | 30.3 | 0.2 | 0  |
| HCM LOS              | D    |     |    |

| Minor Lane/Major Mvmt | NBL   | NBT | EBLn1 | SBT | SBR |
|-----------------------|-------|-----|-------|-----|-----|
| Capacity (veh/h)      | 767   | -   | 201   | -   | -   |
| HCM Lane V/C Ratio    | 0.028 | -   | 0.297 | -   | -   |
| HCM Control Delay (s) | 9.8   | -   | 30.3  | -   | -   |
| HCM Lane LOS          | A     | -   | D     | -   | -   |
| HCM 95th %ile Q(veh)  | 0.1   | -   | 1.2   | -   | -   |

12239.00 :: Needham Street  
8: Needham Street & TJMaxx Driveway

2025 Build Conditions - with Shuttle Service  
Timing Plan: Weekday Morning

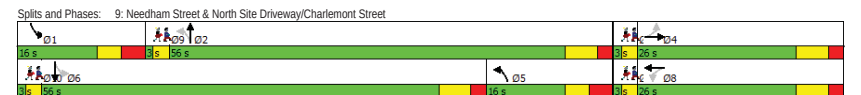
| Intersection             |        |        |       |        |       |      |
|--------------------------|--------|--------|-------|--------|-------|------|
| Int Delay, s/veh         | 0      |        |       |        |       |      |
| Movement                 | WBL    | WBR    | NBT   | NBR    | SBL   | SBT  |
| Lane Configurations      |        |        |       |        |       |      |
| Traffic Vol, veh/h       | 0      | 0      | 900   | 2      | 5     | 815  |
| Future Vol, veh/h        | 0      | 0      | 900   | 2      | 5     | 815  |
| Conflicting Peds, #/hr   | 0      | 0      | 0     | 8      | 8     | 0    |
| Sign Control             | Stop   | Stop   | Free  | Free   | Free  | Free |
| RT Channelized           | -      | None   | -     | None   | -     | None |
| Storage Length           | -      | 0      | -     | -      | 80    | -    |
| Veh in Median Storage, # | 0      | -      | 0     | -      | -     | 0    |
| Grade, %                 | 0      | -      | 0     | -      | -     | 0    |
| Peak Hour Factor         | 92     | 92     | 92    | 92     | 92    | 92   |
| Heavy Vehicles, %        | 0      | 0      | 1     | 1      | 2     | 2    |
| Mvmt Flow                | 0      | 0      | 978   | 2      | 5     | 886  |
| Major/Minor              |        |        |       |        |       |      |
|                          | Minor1 | Major1 |       | Major2 |       |      |
| Conflicting Flow All     | -      | 987    | 0     | 0      | 988   | 0    |
| Stage 1                  | -      | -      | -     | -      | -     | -    |
| Stage 2                  | -      | -      | -     | -      | -     | -    |
| Critical Hdwy            | -      | 6.2    | -     | -      | 4.12  | -    |
| Critical Hdwy Stg 1      | -      | -      | -     | -      | -     | -    |
| Critical Hdwy Stg 2      | -      | -      | -     | -      | -     | -    |
| Follow-up Hdwy           | -      | 3.3    | -     | -      | 2.218 | -    |
| Pot Cap-1 Maneuver       | 0      | 303    | -     | -      | 699   | -    |
| Stage 1                  | 0      | -      | -     | -      | -     | -    |
| Stage 2                  | 0      | -      | -     | -      | -     | -    |
| Platoon blocked, %       | -      | -      | -     | -      | -     | -    |
| Mov Cap-1 Maneuver       | -      | 301    | -     | -      | 699   | -    |
| Mov Cap-2 Maneuver       | -      | -      | -     | -      | -     | -    |
| Stage 1                  | -      | -      | -     | -      | -     | -    |
| Stage 2                  | -      | -      | -     | -      | -     | -    |
| Approach                 |        |        |       |        |       |      |
|                          | WB     | NB     |       | SB     |       |      |
| HCM Control Delay, s     | 0      | 0      |       | 0.1    |       |      |
| HCM LOS                  | A      |        |       |        |       |      |
| Minor Lane/Major Mvmt    |        |        |       |        |       |      |
|                          | NBT    | NBR    | WBLn1 | SBL    | SBT   |      |
| Capacity (veh/h)         | -      | -      | -     | 699    | -     |      |
| HCM Lane V/C Ratio       | -      | -      | -     | 0.008  | -     |      |
| HCM Control Delay (s)    | -      | -      | -     | 10.2   | -     |      |
| HCM Lane LOS             | -      | -      | A     | B      | -     |      |
| HCM 95th %tile Q(veh)    | -      | -      | -     | 0      | -     |      |

12239.00 :: Needham Street  
9: Needham Street & North Site Driveway/Charlemont Street

2025 Build Conditions - with Shuttle Service  
Timing Plan: Weekday Morning

| Lane Group              | EBL   | EBT   | EBR  | WBL   | WBT   | WBR  | NBL   | NBT   | NBR  | SBL   | SBT   | SBR  | Ø3   | Ø7   | Ø9   | Ø10  |
|-------------------------|-------|-------|------|-------|-------|------|-------|-------|------|-------|-------|------|------|------|------|------|
| Lane Configurations     |       |       |      |       |       |      |       |       |      |       |       |      |      |      |      |      |
| Traffic Volume (vph)    | 40    | 0     | 30   | 25    | 0     | 15   | 65    | 785   | 50   | 15    | 765   | 35   |      |      |      |      |
| Future Volume (vph)     | 40    | 0     | 30   | 25    | 0     | 15   | 65    | 785   | 50   | 15    | 765   | 35   |      |      |      |      |
| Ideal Flow (vphpl)      | 1900  | 1900  | 1900 | 1900  | 1900  | 1900 | 1900  | 1900  | 1900 | 1900  | 1900  | 1900 |      |      |      |      |
| Storage Length (ft)     | 125   | 0     | 125  | 0     | 100   | 0    | 100   | 0     | 100  | 0     | 100   | 0    |      |      |      |      |
| Storage Lanes           | 1     | 0     | 1    | 0     | 1     | 0    | 1     | 0     | 1    | 0     | 1     | 0    |      |      |      |      |
| Taper Length (ft)       | 25    |       | 25   |       | 25    |      | 25    |       | 25   |       | 25    |      |      |      |      |      |
| Satd. Flow (prot)       | 1805  | 1615  | 0    | 1805  | 1578  | 0    | 1770  | 1842  | 0    | 1770  | 1849  | 0    |      |      |      |      |
| Flt Permitted           | 0.744 |       |      | 0.728 |       |      | 0.227 |       |      | 0.151 |       |      |      |      |      |      |
| Satd. Flow (perm)       | 1409  | 1615  | 0    | 1383  | 1578  | 0    | 423   | 1842  | 0    | 281   | 1849  | 0    |      |      |      |      |
| Right Turn on Red       |       |       | Yes  |       |       | Yes  |       |       | Yes  |       |       | Yes  |      |      |      |      |
| Satd. Flow (RTOR)       |       | 336   |      |       | 295   |      |       | 4     |      |       | 3     |      |      |      |      |      |
| Link Speed (mph)        |       | 30    |      |       | 30    |      |       | 30    |      |       | 30    |      |      |      |      |      |
| Link Distance (ft)      |       | 491   |      |       | 563   |      |       | 244   |      |       | 497   |      |      |      |      |      |
| Travel Time (s)         |       | 11.2  |      |       | 12.8  |      |       | 5.5   |      |       | 11.3  |      |      |      |      |      |
| Confl. Peds. (#/hr)     | 1     |       |      |       |       | 1    | 2     |       | 6    | 6     |       | 2    |      |      |      |      |
| Confl. Bikes (#/hr)     |       |       |      |       |       |      |       |       | 1    |       |       |      |      |      |      |      |
| Peak Hour Factor        | 0.67  | 0.67  | 0.67 | 0.75  | 0.75  | 0.75 | 0.97  | 0.97  | 0.97 | 0.96  | 0.96  | 0.96 |      |      |      |      |
| Heavy Vehicles (%)      | 0%    | 0%    | 0%   | 0%    | 0%    | 0%   | 2%    | 2%    | 2%   | 2%    | 2%    | 2%   |      |      |      |      |
| Shared Lane Traffic (%) |       |       |      |       |       |      |       |       |      |       |       |      |      |      |      |      |
| Lane Group Flow (vph)   | 60    | 45    | 0    | 33    | 20    | 0    | 67    | 861   | 0    | 16    | 833   | 0    |      |      |      |      |
| Turn Type               | Perm  | NA    |      | Perm  | NA    |      | pm+pt | NA    |      | pm+pt | NA    |      |      |      |      |      |
| Protected Phases        | 4     |       |      | 8     |       |      | 5     | 2     |      | 1     | 6     |      | 3    | 7    | 9    | 10   |
| Permitted Phases        | 4     |       |      | 8     |       |      | 2     |       |      | 6     |       |      |      |      |      |      |
| Detector Phase          | 4     | 4     |      | 8     | 8     |      | 5     | 2     |      | 1     | 6     |      |      |      |      |      |
| Switch Phase            |       |       |      |       |       |      |       |       |      |       |       |      |      |      |      |      |
| Minimum Initial (s)     | 3.0   | 3.0   |      | 3.0   | 3.0   |      | 3.0   | 3.0   |      | 3.0   | 3.0   |      | 1.0  | 1.0  | 1.0  | 1.0  |
| Minimum Split (s)       | 23.0  | 23.0  |      | 23.0  | 23.0  |      | 9.0   | 22.0  |      | 9.0   | 22.0  |      | 3.0  | 3.0  | 3.0  | 3.0  |
| Total Split (s)         | 26.0  | 26.0  |      | 26.0  | 26.0  |      | 16.0  | 56.0  |      | 16.0  | 56.0  |      | 3.0  | 3.0  | 3.0  | 3.0  |
| Total Split (%)         | 25.0% | 25.0% |      | 25.0% | 25.0% |      | 15.4% | 53.8% |      | 15.4% | 53.8% |      | 3%   | 3%   | 3%   | 3%   |
| Yellow Time (s)         | 4.0   | 4.0   |      | 4.0   | 4.0   |      | 3.0   | 4.0   |      | 3.0   | 4.0   |      | 2.0  | 2.0  | 2.0  | 2.0  |
| All-Red Time (s)        | 2.0   | 2.0   |      | 2.0   | 2.0   |      | 3.0   | 2.0   |      | 3.0   | 2.0   |      | 0.0  | 0.0  | 0.0  | 0.0  |
| Lost Time Adjust (s)    | 0.0   | 0.0   |      | 0.0   | 0.0   |      | 0.0   | 0.0   |      | 0.0   | 0.0   |      |      |      |      |      |
| Total Lost Time (s)     | 6.0   | 6.0   |      | 6.0   | 6.0   |      | 6.0   | 6.0   |      | 6.0   | 6.0   |      |      |      |      |      |
| Lead/Lag                | Lag   | Lag   |      | Lag   | Lag   |      | 6.0   | 6.0   |      | Lead  | Lag   |      | Lead | Lead | Lag  | Lead |
| Lead-Lag Optimize?      |       |       |      |       |       |      |       |       |      |       |       |      |      |      |      |      |
| Recall Mode             | None  | None  |      | None  | None  |      | None  | Min   |      | None  | Min   |      | None | None | None | None |
| Act Effect Green (s)    | 9.1   | 9.1   |      | 8.7   | 8.7   |      | 52.0  | 52.5  |      | 44.6  | 46.2  |      |      |      |      |      |
| Actuated g/C Ratio      | 0.13  | 0.13  |      | 0.12  | 0.12  |      | 0.73  | 0.74  |      | 0.63  | 0.65  |      |      |      |      |      |
| v/c Ratio               | 0.33  | 0.09  |      | 0.20  | 0.04  |      | 0.17  | 0.63  |      | 0.06  | 0.69  |      |      |      |      |      |
| Control Delay           | 36.6  | 0.4   |      | 34.8  | 0.2   |      | 9.4   | 12.7  |      | 8.7   | 17.6  |      |      |      |      |      |
| Queue Delay             | 0.0   | 0.0   |      | 0.0   | 0.0   |      | 0.0   | 0.0   |      | 0.0   | 0.0   |      |      |      |      |      |
| Total Delay             | 36.6  | 0.4   |      | 34.8  | 0.2   |      | 9.4   | 12.7  |      | 8.7   | 17.6  |      |      |      |      |      |
| LOS                     | D     | A     |      | C     | A     |      | A     | B     |      | A     | B     |      |      |      |      |      |
| Approach Delay          |       | 21.1  |      |       | 21.7  |      |       | 12.5  |      |       | 17.5  |      |      |      |      |      |
| Approach LOS            |       | C     |      |       | C     |      |       | B     |      |       | B     |      |      |      |      |      |
| Queue Length 50th (ft)  | 25    | 0     |      | 13    | 0     |      | 7     | 154   |      | 3     | 259   |      |      |      |      |      |
| Queue Length 95th (ft)  | 48    | 0     |      | 37    | 0     |      | 41    | #725  |      | 13    | #685  |      |      |      |      |      |
| Internal Link Dist (ft) |       | 411   |      |       | 483   |      |       | 164   |      |       | 417   |      |      |      |      |      |
| Turn Bay Length (ft)    | 125   |       |      | 125   |       |      | 100   |       |      | 100   |       |      |      |      |      |      |
| Base Capacity (vph)     | 428   | 724   |      | 420   | 684   |      | 537   | 1365  |      | 402   | 1331  |      |      |      |      |      |
| Starvation Cap Reductn  | 0     | 0     |      | 0     | 0     |      | 0     | 0     |      | 0     | 0     |      |      |      |      |      |
| Spillback Cap Reductn   | 0     | 0     |      | 0     | 0     |      | 0     | 0     |      | 0     | 0     |      |      |      |      |      |
| Storage Cap Reductn     | 0     | 0     |      | 0     | 0     |      | 0     | 0     |      | 0     | 0     |      |      |      |      |      |
| Reduced v/c Ratio       | 0.14  | 0.06  |      | 0.08  | 0.03  |      | 0.12  | 0.63  |      | 0.04  | 0.63  |      |      |      |      |      |

| Intersection Summary                                            |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|-----------------------------------------------------------------|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|
| Area Type: Other                                                |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Cycle Length: 104                                               |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Actuated Cycle Length: 71.1                                     |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Natural Cycle: 90                                               |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Control Type: Actuated-Uncoordinated                            |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Maximum v/c Ratio: 0.69                                         |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Intersection Signal Delay: 15.4                                 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Intersection Capacity Utilization 71.6%                         |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Analysis Period (min) 15                                        |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| # 95th percentile volume exceeds capacity, queue may be longer. |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Queue shown is maximum after two cycles.                        |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |



12239.00 :: Needham Street  
10: Needham Street & Tower Road/Industrial Place

2025 Build Conditions - with Shuttle Service  
Timing Plan: Weekday Morning

| Intersection             |        |       |       |        |       |       |        |      |      |        |      |      |
|--------------------------|--------|-------|-------|--------|-------|-------|--------|------|------|--------|------|------|
| Int Delay, s/veh         | 3.2    |       |       |        |       |       |        |      |      |        |      |      |
| Movement                 | EBL    | EBT   | EBR   | WBL    | WBT   | WBR   | NBL    | NBT  | NBR  | SBL    | SBT  | SBR  |
| Lane Configurations      |        | ↕     |       |        | ↕     |       |        | ↕    |      | ↕      | ↕    |      |
| Traffic Vol, veh/h       | 25     | 0     | 15    | 5      | 0     | 10    | 15     | 810  | 15   | 5      | 860  | 40   |
| Future Vol, veh/h        | 25     | 0     | 15    | 5      | 0     | 10    | 15     | 810  | 15   | 5      | 860  | 40   |
| Conflicting Peds, #/hr   | 0      | 0     | 1     | 1      | 0     | 0     | 4      | 0    | 2    | 2      | 0    | 4    |
| Sign Control             | Stop   | Stop  | Stop  | Stop   | Stop  | Stop  | Free   | Free | Free | Free   | Free | Free |
| RT Channelized           | -      | -     | None  | -      | -     | None  | -      | -    | None | -      | -    | None |
| Storage Length           | -      | -     | -     | -      | -     | -     | -      | -    | -    | 100    | -    | -    |
| Veh in Median Storage, # | -      | 0     | -     | -      | 0     | -     | -      | 0    | -    | -      | 0    | -    |
| Grade, %                 | -      | 0     | -     | -      | 0     | -     | -      | 0    | -    | -      | 0    | -    |
| Peak Hour Factor         | 92     | 92    | 92    | 92     | 92    | 92    | 92     | 92   | 92   | 92     | 92   | 92   |
| Heavy Vehicles, %        | 5      | 5     | 5     | 13     | 13    | 13    | 3      | 3    | 3    | 2      | 2    | 2    |
| Mvmt Flow                | 27     | 0     | 16    | 5      | 0     | 11    | 16     | 880  | 16   | 5      | 935  | 43   |
| Major/Minor              | Minor2 |       |       | Minor1 |       |       | Major1 |      |      | Major2 |      |      |
| Conflicting Flow All     | 1898   | 1902  | 962   | 1900   | 1916  | 891   | 982    | 0    | 0    | 899    | 0    | 0    |
| Stage 1                  | 971    | 971   | -     | 923    | 923   | -     | -      | -    | -    | -      | -    | -    |
| Stage 2                  | 927    | 931   | -     | 977    | 993   | -     | -      | -    | -    | -      | -    | -    |
| Critical Hdwy            | 7.15   | 6.55  | 6.25  | 7.23   | 6.63  | 6.33  | 4.13   | -    | -    | 4.12   | -    | -    |
| Critical Hdwy Stg 1      | 6.15   | 5.55  | -     | 6.23   | 5.63  | -     | -      | -    | -    | -      | -    | -    |
| Critical Hdwy Stg 2      | 6.15   | 5.55  | -     | 6.23   | 5.63  | -     | -      | -    | -    | -      | -    | -    |
| Follow-up Hdwy           | 3.545  | 4.045 | 3.345 | 3.617  | 4.117 | 3.417 | 2.227  | -    | -    | 2.218  | -    | -    |
| Pot Cap-1 Maneuver       | 52     | 68    | 306   | 49     | 63    | 326   | 699    | -    | -    | 756    | -    | -    |
| Stage 1                  | 300    | 327   | -     | 309    | 334   | -     | -      | -    | -    | -      | -    | -    |
| Stage 2                  | 318    | 342   | -     | 288    | 310   | -     | -      | -    | -    | -      | -    | -    |
| Platoon blocked, %       | -      | -     | -     | -      | -     | -     | -      | -    | -    | -      | -    | -    |
| Mov Cap-1 Maneuver       | 48     | 64    | 305   | 44     | 59    | 325   | 698    | -    | -    | 756    | -    | -    |
| Mov Cap-2 Maneuver       | 48     | 64    | -     | 44     | 59    | -     | -      | -    | -    | -      | -    | -    |
| Stage 1                  | 285    | 324   | -     | 294    | 318   | -     | -      | -    | -    | -      | -    | -    |
| Stage 2                  | 293    | 326   | -     | 271    | 307   | -     | -      | -    | -    | -      | -    | -    |
| Approach                 | EB     |       |       | WB     |       |       | NB     |      |      | SB     |      |      |
| HCM Control Delay, s     | 118.3  |       |       | 45.9   |       |       | 0.2    |      |      | 0.1    |      |      |
| HCM LOS                  | F      |       |       | E      |       |       |        |      |      |        |      |      |
| Minor Lane/Major Mvmt    | NBL    | NBT   | NBR   | EBLn1  | WBLn1 | SBL   | SBT    | SBR  |      |        |      |      |
| Capacity (veh/h)         | 698    | -     | -     | 70     | 104   | 756   | -      | -    |      |        |      |      |
| HCM Lane V/C Ratio       | 0.023  | -     | -     | 0.621  | 0.157 | 0.007 | -      | -    |      |        |      |      |
| HCM Control Delay (s)    | 10.3   | 0     | -     | 118.3  | 45.9  | 9.8   | -      | -    |      |        |      |      |
| HCM Lane LOS             | B      | A     | -     | F      | E     | A     | -      | -    |      |        |      |      |
| HCM 95th %tile Q(veh)    | 0.1    | -     | -     | 2.7    | 0.5   | 0     | -      | -    |      |        |      |      |

12239.00 :: Needham Street  
11: Needham Street & Jaconnet Street

2025 Build Conditions - with Shuttle Service  
Timing Plan: Weekday Morning

| Intersection             |        |        |       |        |       |      |
|--------------------------|--------|--------|-------|--------|-------|------|
| Int Delay, s/veh         | 0.3    |        |       |        |       |      |
| Movement                 | WBL    | WBR    | NBT   | NBR    | SBL   | SBT  |
| Lane Configurations      | ↔      |        | ↔     |        | ↔     | ↔    |
| Traffic Vol, veh/h       | 5      | 10     | 810   | 20     | 2     | 900  |
| Future Vol, veh/h        | 5      | 10     | 810   | 20     | 2     | 900  |
| Conflicting Peds, #/hr   | 0      | 1      | 0     | 17     | 17    | 0    |
| Sign Control             | Stop   | Stop   | Free  | Free   | Free  | Free |
| RT Channelized           | -      | None   | -     | None   | -     | None |
| Storage Length           | 0      | -      | -     | -      | 100   | -    |
| Veh in Median Storage, # | 0      | -      | 0     | -      | -     | 0    |
| Grade, %                 | 0      | -      | 0     | -      | -     | 0    |
| Peak Hour Factor         | 92     | 92     | 92    | 92     | 92    | 92   |
| Heavy Vehicles, %        | 0      | 0      | 2     | 2      | 2     | 2    |
| Mvmt Flow                | 5      | 11     | 880   | 22     | 2     | 978  |
| Major/Minor              | Minor1 | Major1 |       | Major2 |       |      |
| Conflicting Flow All     | 1891   | 909    | 0     | 0      | 919   | 0    |
| Stage 1                  | 908    | -      | -     | -      | -     | -    |
| Stage 2                  | 983    | -      | -     | -      | -     | -    |
| Critical Hdwy            | 6.4    | 6.2    | -     | -      | 4.12  | -    |
| Critical Hdwy Stg 1      | 5.4    | -      | -     | -      | -     | -    |
| Critical Hdwy Stg 2      | 5.4    | -      | -     | -      | -     | -    |
| Follow-up Hdwy           | 3.5    | 3.3    | -     | -      | 2.218 | -    |
| Pot Cap-1 Maneuver       | 78     | 336    | -     | -      | 743   | -    |
| Stage 1                  | 397    | -      | -     | -      | -     | -    |
| Stage 2                  | 366    | -      | -     | -      | -     | -    |
| Platoon blocked, %       |        |        | -     | -      | -     | -    |
| Mov Cap-1 Maneuver       | 77     | 331    | -     | -      | 742   | -    |
| Mov Cap-2 Maneuver       | 77     | -      | -     | -      | -     | -    |
| Stage 1                  | 391    | -      | -     | -      | -     | -    |
| Stage 2                  | 365    | -      | -     | -      | -     | -    |
| Approach                 | WB     | NB     |       | SB     |       |      |
| HCM Control Delay, s     | 30.4   | 0      |       | 0      |       |      |
| HCM LOS                  | D      |        |       |        |       |      |
| Minor Lane/Major Mvmt    | NBT    | NBR    | WBLn1 | SBL    | SBT   |      |
| Capacity (veh/h)         | -      | -      | 158   | 742    | -     |      |
| HCM Lane V/C Ratio       | -      | -      | 0.103 | 0.003  | -     |      |
| HCM Control Delay (s)    | -      | -      | 30.4  | 9.9    | -     |      |
| HCM Lane LOS             | -      | -      | D     | A      | -     |      |
| HCM 95th %ile Q(veh)     | -      | -      | 0.3   | 0      | -     |      |

12239.00 :: Needham Street  
12: Needham Street & Rockland Street

2025 Build Conditions - with Shuttle Service  
Timing Plan: Weekday Morning

| Intersection             |        |       |        |       |       |      |
|--------------------------|--------|-------|--------|-------|-------|------|
| Int Delay, s/veh         | 0.3    |       |        |       |       |      |
| Movement                 | WBL    | WBR   | NBT    | NBR   | SBL   | SBT  |
| Lane Configurations      | W      |       | W      |       | W     | W    |
| Traffic Vol, veh/h       | 5      | 5     | 765    | 5     | 10    | 945  |
| Future Vol, veh/h        | 5      | 5     | 765    | 5     | 10    | 945  |
| Conflicting Peds, #/hr   | 1      | 0     | 0      | 9     | 9     | 0    |
| Sign Control             | Stop   | Stop  | Free   | Free  | Free  | Free |
| RT Channelized           | -      | None  | -      | None  | -     | None |
| Storage Length           | 0      | -     | -      | -     | 125   | -    |
| Veh in Median Storage, # | 0      | -     | 0      | -     | -     | 0    |
| Grade, %                 | 0      | -     | 0      | -     | -     | 0    |
| Peak Hour Factor         | 92     | 92    | 92     | 92    | 92    | 92   |
| Heavy Vehicles, %        | 0      | 0     | 2      | 2     | 2     | 2    |
| Mvmt Flow                | 5      | 5     | 832    | 5     | 11    | 1027 |
| Major/Minor              |        |       |        |       |       |      |
| Minor1                   | Major1 |       | Major2 |       |       |      |
| Conflicting Flow All     | 1893   | 843   | 0      | 0     | 846   | 0    |
| Stage 1                  | 843    | -     | -      | -     | -     | -    |
| Stage 2                  | 1050   | -     | -      | -     | -     | -    |
| Critical Hdwy            | 6.4    | 6.2   | -      | -     | 4.12  | -    |
| Critical Hdwy Stg 1      | 5.4    | -     | -      | -     | -     | -    |
| Critical Hdwy Stg 2      | 5.4    | -     | -      | -     | -     | -    |
| Follow-up Hdwy           | 3.5    | 3.3   | -      | -     | 2.218 | -    |
| Pot Cap-1 Maneuver       | 78     | 367   | -      | -     | 791   | -    |
| Stage 1                  | 426    | -     | -      | -     | -     | -    |
| Stage 2                  | 340    | -     | -      | -     | -     | -    |
| Platoon blocked, %       | -      | -     | -      | -     | -     | -    |
| Mov Cap-1 Maneuver       | 76     | 364   | -      | -     | 791   | -    |
| Mov Cap-2 Maneuver       | 76     | -     | -      | -     | -     | -    |
| Stage 1                  | 423    | -     | -      | -     | -     | -    |
| Stage 2                  | 335    | -     | -      | -     | -     | -    |
| Approach                 |        |       |        |       |       |      |
| WB                       | NB     |       | SB     |       |       |      |
| HCM Control Delay, s     | 36.3   | 0     | 0.1    |       |       |      |
| HCM LOS                  | E      |       |        |       |       |      |
| Minor Lane/Major Mvmt    |        |       |        |       |       |      |
| NBT                      | NBR    | WBLn1 | SBL    | SBT   |       |      |
| Capacity (veh/h)         | -      | -     | 126    | 791   | -     | -    |
| HCM Lane V/C Ratio       | -      | -     | 0.086  | 0.014 | -     | -    |
| HCM Control Delay (s)    | -      | -     | 36.3   | 9.6   | -     | -    |
| HCM Lane LOS             | -      | -     | E      | A     | -     | -    |
| HCM 95th %tile Q(veh)    | -      | -     | 0.3    | 0     | -     | -    |

12239.00 :: Needham Street  
13: Needham Street & Avalon Driveway/Columbia Avenue

2025 Build Conditions - with Shuttle Service  
Timing Plan: Weekday Morning

| Lane Group              | EBL   | EBT   | EBR   | WBL   | WBR   | NBL   | NBT   | NBR   | SBL   | SBT   | SBR   | Ø1   | Ø3   | Ø5   | Ø7   |
|-------------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|------|------|------|------|
| Lane Configurations     | EB    | EB    | EB    | WB    | WB    | NB    | NB    | NB    | SB    | SB    | SB    |      |      |      |      |
| Traffic Volume (vph)    | 25    | 0     | 25    | 15    | 5     | 15    | 15    | 755   | 1     | 1     | 940   | 15   |      |      |      |
| Future Volume (vph)     | 25    | 0     | 25    | 15    | 5     | 15    | 15    | 755   | 1     | 1     | 940   | 15   |      |      |      |
| Ideal Flow (vphpl)      | 1900  | 1900  | 1900  | 1900  | 1900  | 1900  | 1900  | 1900  | 1900  | 1900  | 1900  |      |      |      |      |
| Storage Length (ft)     | 0     |       | 50    | 0     |       | 0     | 125   | 0     | 0     | 100   | 0     |      |      |      |      |
| Storage Lanes           | 0     |       | 1     | 0     |       | 0     | 1     | 0     | 0     | 1     | 0     |      |      |      |      |
| Taper Length (ft)       | 25    |       |       | 25    |       | 25    |       |       | 25    |       |       |      |      |      |      |
| Satd. Flow (prot)       | 0     | 1736  | 1553  | 0     | 1713  | 0     | 1752  | 1845  | 0     | 1770  | 1858  | 0    |      |      |      |
| Flt Permitted           |       |       |       |       | 0.848 |       | 0.161 |       |       | 0.281 |       |      |      |      |      |
| Satd. Flow (perm)       | 0     | 1770  | 1511  | 0     | 1479  | 0     | 297   | 1845  | 0     | 523   | 1858  | 0    |      |      |      |
| Right Turn on Red       |       | Yes   |       |       | Yes   |       |       | Yes   |       |       | Yes   |      |      |      |      |
| Satd. Flow (RTOR)       |       | 80    |       |       | 16    |       |       |       |       | 2     |       |      |      |      |      |
| Link Speed (mph)        | 30    |       | 30    |       | 30    |       | 30    |       |       | 30    |       |      |      |      |      |
| Link Distance (ft)      | 190   |       | 435   |       | 338   |       | 1135  |       |       |       |       |      |      |      |      |
| Travel Time (s)         | 4.3   |       | 9.9   |       | 7.7   |       | 25.8  |       |       |       |       |      |      |      |      |
| Confl. Peds. (#/hr)     | 11    |       | 2     | 2     |       | 11    | 8     |       | 5     | 5     |       | 8    |      |      |      |
| Confl. Bikes (#/hr)     |       |       |       |       |       |       |       | 1     |       |       |       |      |      |      |      |
| Peak Hour Factor        | 0.92  | 0.92  | 0.92  | 0.92  | 0.92  | 0.92  | 0.92  | 0.92  | 0.92  | 0.92  | 0.92  |      |      |      |      |
| Heavy Vehicles (%)      | 4%    | 4%    | 4%    | 0%    | 0%    | 0%    | 3%    | 3%    | 3%    | 2%    | 2%    |      |      |      |      |
| Shared Lane Traffic (%) |       |       |       |       |       |       |       |       |       |       |       |      |      |      |      |
| Lane Group Flow (vph)   | 0     | 27    | 27    | 0     | 37    | 0     | 16    | 822   | 0     | 1     | 1038  | 0    |      |      |      |
| Turn Type               | Perm  | NA    | Perm  | Perm  | NA    | Perm  | NA    | Perm  | NA    | Perm  | NA    |      |      |      |      |
| Protected Phases        | 4     | NA    | 8     | 8     | 8     | 2     | 2     | 6     | 6     | 6     | 6     | 1    | 3    | 5    | 7    |
| Permitted Phases        | 4     | 4     | 8     | 8     | 8     | 2     | 2     | 6     | 6     | 6     | 6     |      |      |      |      |
| Detector Phase          | 4     | 4     | 4     | 8     | 8     | 2     | 2     | 6     | 6     | 6     | 6     |      |      |      |      |
| Switch Phase            |       |       |       |       |       |       |       |       |       |       |       |      |      |      |      |
| Minimum Initial (s)     | 4.0   | 4.0   | 4.0   | 4.0   | 4.0   | 10.0  | 10.0  | 10.0  | 10.0  | 10.0  | 10.0  | 1.0  | 1.0  | 1.0  | 1.0  |
| Minimum Split (s)       | 19.0  | 19.0  | 19.0  | 22.0  | 22.0  | 16.0  | 16.0  | 20.0  | 20.0  | 20.0  | 20.0  | 3.0  | 3.0  | 3.0  | 3.0  |
| Total Split (s)         | 18.0  | 18.0  | 18.0  | 18.0  | 18.0  | 71.0  | 71.0  | 71.0  | 71.0  | 71.0  | 71.0  | 3.0  | 3.0  | 3.0  | 3.0  |
| Total Split (%)         | 18.9% | 18.9% | 18.9% | 18.9% | 18.9% | 74.7% | 74.7% | 74.7% | 74.7% | 74.7% | 74.7% | 3%   | 3%   | 3%   | 3%   |
| Yellow Time (s)         | 4.0   | 4.0   | 4.0   | 4.0   | 4.0   | 4.0   | 4.0   | 4.0   | 4.0   | 4.0   | 4.0   | 2.0  | 2.0  | 2.0  | 2.0  |
| All-Red Time (s)        | 2.0   | 2.0   | 2.0   | 2.0   | 2.0   | 2.0   | 2.0   | 2.0   | 2.0   | 2.0   | 2.0   | 0.0  | 0.0  | 0.0  | 0.0  |
| Lost Time Adjust (s)    | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   |      |      |      |      |
| Total Lost Time (s)     | 6.0   | 6.0   | 6.0   | 6.0   | 6.0   | 6.0   | 6.0   | 6.0   | 6.0   | 6.0   | 6.0   |      |      |      |      |
| Lead/Lag                | Lag   | Lag   | Lag   | Lag   | Lag   | Lag   | Lag   | Lag   | Lag   | Lag   | Lag   | Lead | Lead | Lead | Lead |
| Lead-Lag Optimize?      |       |       |       |       |       |       |       |       |       |       |       |      |      |      |      |
| Recall Mode             | None  | None  | None  | None  | None  | None  | None  | None  | None  | None  | None  | None | None | None | None |
| Act Effct Green (s)     | 8.6   | 8.6   | 8.4   | 41.1  | 41.1  | 8.4   | 41.1  | 41.1  | 41.1  | 41.1  | 41.1  |      |      |      |      |
| Actuated g/C Ratio      | 0.17  | 0.17  | 0.16  | 0.80  | 0.80  | 0.80  | 0.80  | 0.80  | 0.80  | 0.80  | 0.80  |      |      |      |      |
| v/c Ratio               | 0.09  | 0.08  | 0.14  | 0.07  | 0.56  | 0.07  | 0.56  | 0.00  | 0.70  | 0.00  | 0.70  |      |      |      |      |
| Control Delay           | 30.1  | 0.5   | 22.7  | 5.6   | 7.6   | 5.0   | 10.8  | 0.0   | 0.0   | 0.0   | 0.0   |      |      |      |      |
| Queue Delay             | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   |      |      |      |      |
| Total Delay             | 30.1  | 0.5   | 22.7  | 5.6   | 7.6   | 5.0   | 10.8  | 0.0   | 0.0   | 0.0   | 0.0   |      |      |      |      |
| LOS                     | C     | A     | C     | A     | A     | A     | B     | A     | B     | A     | B     |      |      |      |      |
| Approach Delay          | 15.3  |       | 22.7  |       | 7.5   |       | 10.8  |       |       |       |       |      |      |      |      |
| Approach LOS            | B     |       | C     |       | A     |       | B     |       |       |       |       |      |      |      |      |
| Queue Length 50th (ft)  | 8     | 0     | 6     |       | 1     |       | 193   |       |       |       |       |      |      |      |      |
| Queue Length 95th (ft)  | 40    | 0     | 40    |       | 12    |       | #698  |       |       |       |       |      |      |      |      |
| Internal Link Dist (ft) | 110   |       | 355   |       | 258   |       | 1055  |       |       |       |       |      |      |      |      |
| Turn Bay Length (ft)    |       | 50    |       |       | 125   |       | 100   |       |       |       |       |      |      |      |      |
| Base Capacity (vph)     | 619   | 581   | 528   | 277   | 1718  | 487   | 1730  |       |       |       |       |      |      |      |      |
| Starvation Cap Reductn  | 0     | 0     | 0     | 0     | 0     | 0     | 0     |       |       |       |       |      |      |      |      |
| Spillback Cap Reductn   | 0     | 0     | 0     | 0     | 0     | 0     | 0     |       |       |       |       |      |      |      |      |
| Storage Cap Reductn     | 0     | 0     | 0     | 0     | 0     | 0     | 0     |       |       |       |       |      |      |      |      |
| Reduced v/c Ratio       | 0.04  | 0.05  | 0.07  | 0.06  | 0.48  | 0.00  | 0.60  |       |       |       |       |      |      |      |      |

| Intersection Summary                                            |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|-----------------------------------------------------------------|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|
| Area Type: Other                                                |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Cycle Length: 95                                                |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Actuated Cycle Length: 51.2                                     |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Natural Cycle: 80                                               |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Control Type: Actuated-Uncoordinated                            |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Maximum v/c Ratio: 0.70                                         |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Intersection Signal Delay: 9.8                                  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Intersection Capacity Utilization 75.6%                         |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Analysis Period (min) 15                                        |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| # 95th percentile volume exceeds capacity, queue may be longer. |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Queue shown is maximum after two cycles.                        |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |



12239.00 :: Needham Street  
14: Winchester Street & Needham Street/Dedham Street

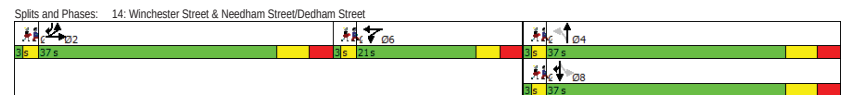
2025 Build Conditions - with Shuttle Service  
Timing Plan: Weekday Morning

| Lane Group              | EBL                                                                               | EBT                                                                               | EBR                                                                               | WBL                                                                               | WBT                                                                               | WBR                                                                               | NBL                                                                               | NBT                                                                               | NBR                                                                               | SBL                                                                               | SBT                                                                               | SBR                                                                               | Ø1   | Ø3   | Ø5   | Ø7   |
|-------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|------|------|------|------|
| Lane Configurations     |  |  |  |  |  |  |  |  |  |  |  |  |      |      |      |      |
| Traffic Volume (vph)    | 740                                                                               | 95                                                                                | 45                                                                                | 15                                                                                | 125                                                                               | 155                                                                               | 30                                                                                | 290                                                                               | 5                                                                                 | 50                                                                                | 345                                                                               | 815                                                                               |      |      |      |      |
| Future Volume (vph)     | 740                                                                               | 95                                                                                | 45                                                                                | 15                                                                                | 125                                                                               | 155                                                                               | 30                                                                                | 290                                                                               | 5                                                                                 | 50                                                                                | 345                                                                               | 815                                                                               |      |      |      |      |
| Ideal Flow (vphpl)      | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                              |      |      |      |      |
| Storage Length (ft)     | 340                                                                               |                                                                                   | 75                                                                                | 0                                                                                 |                                                                                   | 0                                                                                 | 100                                                                               |                                                                                   | 0                                                                                 |                                                                                   | 0                                                                                 |                                                                                   |      |      |      |      |
| Storage Lanes           | 1                                                                                 |                                                                                   | 1                                                                                 | 0                                                                                 |                                                                                   | 0                                                                                 | 1                                                                                 |                                                                                   | 0                                                                                 |                                                                                   | 0                                                                                 |                                                                                   |      |      |      |      |
| Taper Length (ft)       | 25                                                                                |                                                                                   |                                                                                   | 25                                                                                |                                                                                   |                                                                                   | 25                                                                                |                                                                                   |                                                                                   | 25                                                                                |                                                                                   |                                                                                   |      |      |      |      |
| Satd. Flow (prot)       | 3433                                                                              | 1758                                                                              | 0                                                                                 | 0                                                                                 | 1740                                                                              | 0                                                                                 | 1770                                                                              | 1858                                                                              | 0                                                                                 | 0                                                                                 | 1870                                                                              | 1599                                                                              |      |      |      |      |
| Flt Permitted           | 0.950                                                                             |                                                                                   |                                                                                   |                                                                                   | 0.998                                                                             |                                                                                   | 0.295                                                                             |                                                                                   |                                                                                   |                                                                                   | 0.811                                                                             |                                                                                   |      |      |      |      |
| Satd. Flow (perm)       | 3389                                                                              | 1758                                                                              | 0                                                                                 | 0                                                                                 | 1739                                                                              | 0                                                                                 | 550                                                                               | 1858                                                                              | 0                                                                                 | 0                                                                                 | 1526                                                                              | 1599                                                                              |      |      |      |      |
| Right Turn on Red       |                                                                                   |                                                                                   | Yes                                                                               |                                                                                   |                                                                                   | Yes                                                                               |                                                                                   | No                                                                                |                                                                                   |                                                                                   | Yes                                                                               |                                                                                   |      |      |      |      |
| Satd. Flow (RTOR)       |                                                                                   | 23                                                                                |                                                                                   |                                                                                   | 45                                                                                |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   | 424                                                                               |                                                                                   |      |      |      |      |
| Link Speed (mph)        |                                                                                   | 30                                                                                |                                                                                   |                                                                                   | 30                                                                                |                                                                                   |                                                                                   | 30                                                                                |                                                                                   |                                                                                   | 30                                                                                |                                                                                   |      |      |      |      |
| Link Distance (ft)      |                                                                                   | 1135                                                                              |                                                                                   |                                                                                   | 451                                                                               |                                                                                   |                                                                                   | 634                                                                               |                                                                                   |                                                                                   | 722                                                                               |                                                                                   |      |      |      |      |
| Travel Time (s)         |                                                                                   | 25.8                                                                              |                                                                                   |                                                                                   | 10.3                                                                              |                                                                                   |                                                                                   | 14.4                                                                              |                                                                                   |                                                                                   | 16.4                                                                              |                                                                                   |      |      |      |      |
| Confl. Peds. (#/hr)     | 5                                                                                 |                                                                                   | 1                                                                                 | 1                                                                                 |                                                                                   | 5                                                                                 |                                                                                   |                                                                                   | 1                                                                                 |                                                                                   |                                                                                   |                                                                                   |      |      |      |      |
| Confl. Bikes (#/hr)     |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |      |      |      |      |
| Peak Hour Factor        | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              |      |      |      |      |
| Heavy Vehicles (%)      | 2%                                                                                | 2%                                                                                | 2%                                                                                | 0%                                                                                | 0%                                                                                | 0%                                                                                | 2%                                                                                | 2%                                                                                | 2%                                                                                | 1%                                                                                | 1%                                                                                | 1%                                                                                |      |      |      |      |
| Shared Lane Traffic (%) |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |      |      |      |      |
| Lane Group Flow (vph)   | 904                                                                               | 152                                                                               | 0                                                                                 | 0                                                                                 | 320                                                                               | 0                                                                                 | 33                                                                                | 320                                                                               | 0                                                                                 | 0                                                                                 | 429                                                                               | 886                                                                               |      |      |      |      |
| Turn Type               | Split                                                                             | NA                                                                                |                                                                                   | Split                                                                             | NA                                                                                |                                                                                   | Perm                                                                              | NA                                                                                |                                                                                   | Perm                                                                              | NA                                                                                | pt+ov                                                                             |      |      |      |      |
| Protected Phases        | 2                                                                                 | 2                                                                                 |                                                                                   | 6                                                                                 | 6                                                                                 |                                                                                   |                                                                                   | 4                                                                                 |                                                                                   |                                                                                   | 8                                                                                 | 2 8                                                                               | 1    | 3    | 5    | 7    |
| Permitted Phases        |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   | 4                                                                                 |                                                                                   |                                                                                   | 8                                                                                 |                                                                                   |                                                                                   |      |      |      |      |
| Detector Phase          | 2                                                                                 | 2                                                                                 |                                                                                   | 6                                                                                 | 6                                                                                 |                                                                                   | 4                                                                                 | 4                                                                                 |                                                                                   | 8                                                                                 | 8                                                                                 | 2 8                                                                               |      |      |      |      |
| Switch Phase            |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |      |      |      |      |
| Minimum Initial (s)     | 10.0                                                                              | 10.0                                                                              |                                                                                   | 6.0                                                                               | 6.0                                                                               |                                                                                   | 6.0                                                                               | 6.0                                                                               |                                                                                   | 6.0                                                                               | 6.0                                                                               |                                                                                   | 1.0  | 1.0  | 1.0  | 1.0  |
| Minimum Split (s)       | 17.0                                                                              | 17.0                                                                              |                                                                                   | 19.0                                                                              | 19.0                                                                              |                                                                                   | 20.0                                                                              | 20.0                                                                              |                                                                                   | 36.0                                                                              | 36.0                                                                              |                                                                                   | 3.0  | 3.0  | 3.0  | 3.0  |
| Total Split (s)         | 37.0                                                                              | 37.0                                                                              |                                                                                   | 21.0                                                                              | 21.0                                                                              |                                                                                   | 37.0                                                                              | 37.0                                                                              |                                                                                   | 37.0                                                                              | 37.0                                                                              |                                                                                   | 3.0  | 3.0  | 3.0  | 3.0  |
| Total Split (%)         | 35.6%                                                                             | 35.6%                                                                             |                                                                                   | 20.2%                                                                             | 20.2%                                                                             |                                                                                   | 35.6%                                                                             | 35.6%                                                                             |                                                                                   | 35.6%                                                                             | 35.6%                                                                             |                                                                                   | 3%   | 3%   | 3%   | 3%   |
| Yellow Time (s)         | 4.0                                                                               | 4.0                                                                               |                                                                                   | 3.0                                                                               | 3.0                                                                               |                                                                                   | 4.0                                                                               | 4.0                                                                               |                                                                                   | 4.0                                                                               | 4.0                                                                               |                                                                                   | 2.0  | 2.0  | 2.0  | 2.0  |
| All-Red Time (s)        | 3.0                                                                               | 3.0                                                                               |                                                                                   | 3.0                                                                               | 3.0                                                                               |                                                                                   | 3.0                                                                               | 3.0                                                                               |                                                                                   | 3.0                                                                               | 3.0                                                                               |                                                                                   | 0.0  | 0.0  | 0.0  | 0.0  |
| Lost Time Adjust (s)    | 0.0                                                                               | 0.0                                                                               |                                                                                   | 0.0                                                                               | 0.0                                                                               |                                                                                   | 0.0                                                                               | 0.0                                                                               |                                                                                   | 0.0                                                                               | 0.0                                                                               |                                                                                   |      |      |      |      |
| Total Lost Time (s)     | 7.0                                                                               | 7.0                                                                               |                                                                                   | 6.0                                                                               | 6.0                                                                               |                                                                                   | 7.0                                                                               | 7.0                                                                               |                                                                                   | 7.0                                                                               | 7.0                                                                               |                                                                                   |      |      |      |      |
| Lead/Lag                | Lag                                                                               | Lag                                                                               |                                                                                   | Lag                                                                               | Lag                                                                               |                                                                                   | Lag                                                                               | Lag                                                                               |                                                                                   | Lag                                                                               | Lag                                                                               |                                                                                   | Lead | Lead | Lead | Lead |
| Lead-Lag Optimize?      |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |      |      |      |      |
| Recall Mode             | None                                                                              | None                                                                              |                                                                                   | None                                                                              | None                                                                              |                                                                                   | None                                                                              | None                                                                              |                                                                                   | None                                                                              | None                                                                              |                                                                                   | None | None | None | None |
| Act Effct Green (s)     | 28.7                                                                              | 28.7                                                                              |                                                                                   | 15.0                                                                              | 15.0                                                                              |                                                                                   | 29.9                                                                              | 29.9                                                                              |                                                                                   | 30.5                                                                              | 64.9                                                                              |                                                                                   |      |      |      |      |
| Actuated g/C Ratio      | 0.30                                                                              | 0.30                                                                              |                                                                                   | 0.16                                                                              | 0.31                                                                              |                                                                                   | 0.31                                                                              |                                                                                   |                                                                                   | 0.32                                                                              | 0.68                                                                              |                                                                                   |      |      |      |      |
| v/c Ratio               | 0.78                                                                              | 0.28                                                                              |                                                                                   | 1.03                                                                              | 0.19                                                                              |                                                                                   | 0.55                                                                              |                                                                                   |                                                                                   | 0.88                                                                              | 0.72                                                                              |                                                                                   |      |      |      |      |
| Control Delay           | 36.9                                                                              | 23.4                                                                              |                                                                                   | 94.3                                                                              | 29.4                                                                              |                                                                                   | 32.4                                                                              |                                                                                   |                                                                                   | 52.6                                                                              | 8.4                                                                               |                                                                                   |      |      |      |      |
| Queue Delay             | 0.0                                                                               | 0.0                                                                               |                                                                                   | 0.0                                                                               | 0.0                                                                               |                                                                                   | 0.0                                                                               |                                                                                   |                                                                                   | 0.0                                                                               | 0.0                                                                               |                                                                                   |      |      |      |      |
| Total Delay             | 36.9                                                                              | 23.4                                                                              |                                                                                   | 94.3                                                                              | 29.4                                                                              |                                                                                   | 32.4                                                                              |                                                                                   |                                                                                   | 52.6                                                                              | 8.4                                                                               |                                                                                   |      |      |      |      |
| LOS                     | D                                                                                 | C                                                                                 |                                                                                   | F                                                                                 | C                                                                                 |                                                                                   | C                                                                                 |                                                                                   |                                                                                   | D                                                                                 | A                                                                                 |                                                                                   |      |      |      |      |
| Approach Delay          |                                                                                   | 34.7                                                                              |                                                                                   |                                                                                   | 94.3                                                                              |                                                                                   |                                                                                   | 32.1                                                                              |                                                                                   |                                                                                   | 22.9                                                                              |                                                                                   |      |      |      |      |
| Approach LOS            |                                                                                   | C                                                                                 |                                                                                   |                                                                                   | F                                                                                 |                                                                                   |                                                                                   | C                                                                                 |                                                                                   |                                                                                   | C                                                                                 |                                                                                   |      |      |      |      |
| Queue Length 50th (ft)  | 221                                                                               | 57                                                                                |                                                                                   |                                                                                   | ~177                                                                              |                                                                                   | 14                                                                                | 159                                                                               |                                                                                   |                                                                                   | 245                                                                               | 119                                                                               |      |      |      |      |
| Queue Length 95th (ft)  | 326                                                                               | 119                                                                               |                                                                                   |                                                                                   | #390                                                                              |                                                                                   | 44                                                                                | 276                                                                               |                                                                                   |                                                                                   | #453                                                                              | 274                                                                               |      |      |      |      |
| Internal Link Dist (ft) |                                                                                   | 1055                                                                              |                                                                                   |                                                                                   | 371                                                                               |                                                                                   |                                                                                   | 554                                                                               |                                                                                   |                                                                                   | 642                                                                               |                                                                                   |      |      |      |      |
| Turn Bay Length (ft)    | 340                                                                               |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   | 100                                                                               |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |      |      |      |      |
| Base Capacity (vph)     | 1082                                                                              | 569                                                                               |                                                                                   |                                                                                   | 312                                                                               |                                                                                   | 173                                                                               | 585                                                                               |                                                                                   |                                                                                   | 487                                                                               | 1240                                                                              |      |      |      |      |
| Starvation Cap Reductn  | 0                                                                                 | 0                                                                                 |                                                                                   |                                                                                   | 0                                                                                 |                                                                                   | 0                                                                                 | 0                                                                                 |                                                                                   |                                                                                   | 0                                                                                 | 0                                                                                 |      |      |      |      |
| Spillback Cap Reductn   | 0                                                                                 | 0                                                                                 |                                                                                   |                                                                                   | 0                                                                                 |                                                                                   | 0                                                                                 | 0                                                                                 |                                                                                   |                                                                                   | 0                                                                                 | 0                                                                                 |      |      |      |      |
| Storage Cap Reductn     | 0                                                                                 | 0                                                                                 |                                                                                   |                                                                                   | 0                                                                                 |                                                                                   | 0                                                                                 | 0                                                                                 |                                                                                   |                                                                                   | 0                                                                                 | 0                                                                                 |      |      |      |      |
| Reduced v/c Ratio       | 0.74                                                                              | 0.27                                                                              |                                                                                   |                                                                                   | 1.03                                                                              |                                                                                   | 0.19                                                                              | 0.55                                                                              |                                                                                   |                                                                                   | 0.88                                                                              | 0.71                                                                              |      |      |      |      |

| Intersection Summary                                            |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|-----------------------------------------------------------------|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|
| Area Type: Other                                                |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Cycle Length: 104                                               |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Actuated Cycle Length: 95.4                                     |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Natural Cycle: 85                                               |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Control Type: Actuated-Uncoordinated                            |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Maximum v/c Ratio: 1.03                                         |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Intersection Signal Delay: 35.6                                 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Intersection Capacity Utilization 99.9%                         |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Analysis Period (min) 15                                        |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| - Volume exceeds capacity, queue is theoretically infinite.     |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Queue shown is maximum after two cycles.                        |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| # 95th percentile volume exceeds capacity, queue may be longer. |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Queue shown is maximum after two cycles.                        |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |

12239.00 :: Needham Street  
14: Winchester Street & Needham Street/Dedham Street

2025 Build Conditions - with Shuttle Service  
Timing Plan: Weekday Morning





12239.00 :: Needham Street

15: Winchester Street &amp; Route 9 EB Access Road

2025 Build Conditions - with Shuttle Service

Timing Plan: Weekday Morning

| Lane Group              | WBL   | WBR    | NBT   | NBR    | SBL    | SBT     | Ø2   | Ø3   | Ø4   | Ø5   | Ø6   |
|-------------------------|-------|--------|-------|--------|--------|---------|------|------|------|------|------|
| Lane Configurations     | ↰     | ↱      | ↰     | ↱      | ↰      | ↱       |      |      |      |      |      |
| Traffic Volume (vph)    | 55    | 285    | 1025  | 215    | 65     | 1210    |      |      |      |      |      |
| Future Volume (vph)     | 55    | 285    | 1025  | 215    | 65     | 1210    |      |      |      |      |      |
| Ideal Flow (vphpl)      | 1900  | 1900   | 1900  | 1900   | 1900   | 1900    |      |      |      |      |      |
| Storage Length (ft)     | 200   | 0      |       |        | 100    | 0       |      |      |      |      |      |
| Storage Lanes           | 1     | 1      |       |        | 1      | 1       |      |      |      |      |      |
| Taper Length (ft)       | 25    |        |       |        | 25     |         |      |      |      |      |      |
| Satd. Flow (prot)       | 1787  | 1599   | 1881  | 1599   | 1787   | 1881    |      |      |      |      |      |
| Flt Permitted           | 0.950 |        |       |        | 0.073  |         |      |      |      |      |      |
| Satd. Flow (perm)       | 1787  | 1599   | 1881  | 1508   | 137    | 1881    |      |      |      |      |      |
| Right Turn on Red       |       | Yes    |       | Yes    |        |         |      |      |      |      |      |
| Satd. Flow (RTOR)       |       | 112    |       | 50     |        |         |      |      |      |      |      |
| Link Speed (mph)        | 30    |        | 30    |        | 30     |         |      |      |      |      |      |
| Link Distance (ft)      | 443   |        | 400   |        | 252    |         |      |      |      |      |      |
| Travel Time (s)         | 10.1  |        | 9.1   |        | 5.7    |         |      |      |      |      |      |
| Confl. Peds. (#/hr)     |       |        |       | 9      | 9      |         |      |      |      |      |      |
| Peak Hour Factor        | 0.92  | 0.92   | 0.92  | 0.92   | 0.92   | 0.92    |      |      |      |      |      |
| Heavy Vehicles (%)      | 1%    | 1%     | 1%    | 1%     | 1%     | 1%      |      |      |      |      |      |
| Shared Lane Traffic (%) |       |        |       |        |        |         |      |      |      |      |      |
| Lane Group Flow (vph)   | 60    | 310    | 1114  | 234    | 71     | 1315    |      |      |      |      |      |
| Turn Type               | Prot  | custom | NA    | custom | custom | NA      |      |      |      |      |      |
| Protected Phases        | 5 6   | 1 5 6  | 2 3   | 5 6    | 1      | 1 2 3 4 | 2    | 3    | 4    | 5    | 6    |
| Permitted Phases        |       |        |       | 2      | 2      |         |      |      |      |      |      |
| Detector Phase          | 5 6   | 1 5 6  | 2 3   | 5 6    | 1      | 1 2 3 4 |      |      |      |      |      |
| Switch Phase            |       |        |       |        |        |         |      |      |      |      |      |
| Minimum Initial (s)     |       |        |       |        | 4.0    |         | 10.0 | 10.0 | 4.0  | 4.0  |      |
| Minimum Split (s)       |       |        |       |        | 10.0   |         | 25.0 | 27.0 | 10.0 | 11.0 | 9.0  |
| Total Split (s)         |       |        |       |        | 23.0   |         | 61.0 | 28.0 | 10.0 | 27.0 | 9.0  |
| Total Split (%)         |       |        |       |        | 14.6%  |         | 39%  | 18%  | 6%   | 17%  | 6%   |
| Yellow Time (s)         |       |        |       |        | 4.0    |         | 4.0  | 4.0  | 4.0  | 3.0  | 3.0  |
| All-Red Time (s)        |       |        |       |        | 2.0    |         | 2.0  | 2.0  | 2.0  | 4.0  | 2.0  |
| Lost Time Adjust (s)    |       |        |       |        | 0.0    |         |      |      |      |      |      |
| Total Lost Time (s)     |       |        |       |        | 6.0    |         |      |      |      |      |      |
| Lead/Lag                |       |        |       |        | Lead   |         | Lag  | Lead | Lag  | Lead | Lag  |
| Lead-Lag Optimize?      |       |        |       |        | None   |         | None | None | None | None | None |
| Recall Mode             |       |        |       |        | None   |         | None | None | None | None | None |
| Act Effct Green (s)     | 29.0  | 53.0   | 83.0  | 83.0   | 72.0   | 116.0   |      |      |      |      |      |
| Actuated g/C Ratio      | 0.18  | 0.34   | 0.53  | 0.53   | 0.46   | 0.73    |      |      |      |      |      |
| v/c Ratio               | 0.18  | 0.51   | 1.13  | 0.28   | 0.30   | 0.95    |      |      |      |      |      |
| Control Delay           | 56.3  | 29.3   | 105.8 | 9.3    | 32.9   | 14.7    |      |      |      |      |      |
| Queue Delay             | 0.0   | 4.6    | 0.6   | 0.0    | 0.0    | 44.2    |      |      |      |      |      |
| Total Delay             | 56.3  | 34.0   | 106.4 | 9.3    | 32.9   | 58.9    |      |      |      |      |      |
| LOS                     | E     | C      | F     | A      | C      | E       |      |      |      |      |      |
| Approach Delay          | 37.6  |        | 89.5  |        |        | 57.6    |      |      |      |      |      |
| Approach LOS            | D     |        | F     |        |        | E       |      |      |      |      |      |
| Queue Length 50th (ft)  | 53    | 163    | ~1326 | 56     | 38     | 301     |      |      |      |      |      |
| Queue Length 95th (ft)  | 99    | 261    | #1592 | 88     | m32    | m178    |      |      |      |      |      |
| Internal Link Dist (ft) | 363   |        | 320   |        |        | 172     |      |      |      |      |      |
| Turn Bay Length (ft)    | 200   |        |       | 100    |        |         |      |      |      |      |      |
| Base Capacity (vph)     | 327   | 610    | 988   | 832    | 239    | 1380    |      |      |      |      |      |
| Starvation Cap Reductn  | 0     | 0      | 20    | 0      | 0      | 384     |      |      |      |      |      |
| Spillback Cap Reductn   | 0     | 226    | 102   | 0      | 0      | 0       |      |      |      |      |      |
| Storage Cap Reductn     | 0     | 0      | 0     | 0      | 0      | 0       |      |      |      |      |      |
| Reduced v/c Ratio       | 0.18  | 0.81   | 1.26  | 0.28   | 0.30   | 1.32    |      |      |      |      |      |

## Intersection Summary

Area Type: Other

Cycle Length: 158

Actuated Cycle Length: 158

Natural Cycle: 145

Control Type: Actuated-Uncoordinated

Maximum v/c Ratio: 1.31

Intersection Signal Delay: 69.1

Intersection LOS: E

Intersection Capacity Utilization 81.6%

ICU Level of Service D

Analysis Period (min) 15

- Volume exceeds capacity, queue is theoretically infinite.

- Queue shown is maximum after two cycles.

# 95th percentile volume exceeds capacity, queue may be longer.

- Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

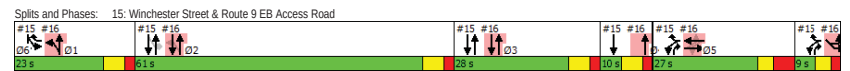
Lanes, Volumes, Timings  
VHB/MSD\vhb\proj\Wat-LD\12239.00\tech\Traffic\Synchro\TIA\_2018\2025 BD\_AM\_AGGRESSIVE.syn  
07/03/2018

12239.00 :: Needham Street

15: Winchester Street &amp; Route 9 EB Access Road

2025 Build Conditions - with Shuttle Service

Timing Plan: Weekday Morning

Lanes, Volumes, Timings  
VHB/MSD\vhb\proj\Wat-LD\12239.00\tech\Traffic\Synchro\TIA\_2018\2025 BD\_AM\_AGGRESSIVE.syn  
07/03/2018

**16: Winchester Street/Centre Street & Route 9 WB Access Road & Driveway**

Timing Plan: Weekday Morning

| Intersection Summary                                                                                                                                                                                                                                                                                             |                        |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------|
| Area Type:                                                                                                                                                                                                                                                                                                       | Other                  |
| Cycle Length:                                                                                                                                                                                                                                                                                                    | 158                    |
| Actuated Cycle Length:                                                                                                                                                                                                                                                                                           | 158                    |
| Natural Cycle:                                                                                                                                                                                                                                                                                                   | 145                    |
| Control Type:                                                                                                                                                                                                                                                                                                    | Actuated-Uncoordinated |
| Maximum v/c Ratio:                                                                                                                                                                                                                                                                                               | 1.31                   |
| Intersection Signal Delay:                                                                                                                                                                                                                                                                                       | 115.8                  |
| Intersection Capacity Utilization:                                                                                                                                                                                                                                                                               | 115.1%                 |
| Analysis Period (min):                                                                                                                                                                                                                                                                                           | 15                     |
| <p>Volume exceeds capacity, queue is theoretically infinite.</p> <p>Queue shown is maximum after two cycles.</p> <p># 95th percentile volume exceeds capacity, queue may be longer.</p> <p>Queue shown is maximum after two cycles.</p> <p>m Volume for 95th percentile queue is metered by upstream signal.</p> |                        |
| Intersection LOS:                                                                                                                                                                                                                                                                                                | F                      |
| ICU Level of Service:                                                                                                                                                                                                                                                                                            | H                      |

**16: Winchester Street/Centre Street & Route 9 WB Access Road & Driveway**

Timing Plan: Weekday Morning

12239.00 :: Needham Street  
17: Centre Street & Walnut Street

2025 Build Conditions - with Shuttle Service  
Timing Plan: Weekday Morning

| Lane Group                                                      | SEL                    | SET   | SER   | NWL   | NWT   | NWR  | NEL   | NET  | NER   | SWL   | SWT   | SWR  | Ø3 |
|-----------------------------------------------------------------|------------------------|-------|-------|-------|-------|------|-------|------|-------|-------|-------|------|----|
| Lane Configurations                                             |                        |       |       |       |       |      |       |      |       |       |       |      |    |
| Traffic Volume (vph)                                            | 20                     | 1     | 400   | 35    | 40    | 0    | 395   | 700  | 2     | 1     | 725   | 30   |    |
| Future Volume (vph)                                             | 20                     | 1     | 400   | 35    | 40    | 0    | 395   | 700  | 2     | 1     | 725   | 30   |    |
| Ideal Flow (vphpl)                                              | 1900                   | 1900  | 1900  | 1900  | 1900  | 1900 | 1900  | 1900 | 1900  | 1900  | 1900  | 1900 |    |
| Storage Length (ft)                                             | 0                      |       | 50    | 0     |       | 0    | 75    | 0    |       | 0     | 0     | 0    |    |
| Storage Lanes                                                   | 0                      |       | 1     | 0     |       | 0    | 1     | 0    |       | 0     | 0     | 0    |    |
| Taper Length (ft)                                               | 25                     |       |       | 25    |       |      | 25    |      |       | 25    |       |      |    |
| Satd. Flow (prot)                                               | 0                      | 1813  | 1615  | 0     | 1856  | 0    | 1770  | 1863 | 0     | 0     | 1889  | 0    |    |
| Flt Permitted                                                   |                        | 0.745 |       |       | 0.839 |      | 0.183 |      |       |       | 0.999 |      |    |
| Satd. Flow (perm)                                               | 0                      | 1346  | 1573  | 0     | 1583  | 0    | 341   | 1863 | 0     | 0     | 1887  | 0    |    |
| Right Turn on Red                                               |                        |       | No    |       |       | No   |       |      | Yes   |       |       | Yes  |    |
| Satd. Flow (RTOR)                                               |                        |       |       |       |       |      |       |      |       |       | 2     |      |    |
| Link Speed (mph)                                                |                        | 30    |       |       | 30    |      |       | 30   |       |       | 30    |      |    |
| Link Distance (ft)                                              |                        | 624   |       |       | 387   |      |       | 508  |       |       | 531   |      |    |
| Travel Time (s)                                                 |                        | 14.2  |       |       | 8.8   |      |       | 11.5 |       |       | 12.1  |      |    |
| Confl. Peds. (#/hr)                                             | 17                     |       | 4     | 4     |       | 17   | 3     |      | 9     | 9     |       | 3    |    |
| Peak Hour Factor                                                | 0.92                   | 0.92  | 0.92  | 0.92  | 0.92  | 0.92 | 0.92  | 0.92 | 0.92  | 0.92  | 0.92  | 0.92 |    |
| Heavy Vehicles (%)                                              | 0%                     | 0%    | 0%    | 0%    | 0%    | 0%   | 2%    | 2%   | 2%    | 0%    | 0%    | 0%   |    |
| Shared Lane Traffic (%)                                         |                        |       |       |       |       |      |       |      |       |       |       |      |    |
| Lane Group Flow (vph)                                           | 0                      | 23    | 435   | 0     | 81    | 0    | 429   | 763  | 0     | 0     | 822   | 0    |    |
| Turn Type                                                       | Perm                   | NA    | pm+ov | Perm  | NA    |      | D,P+P | NA   |       | Perm  | NA    |      |    |
| Protected Phases                                                |                        | 4     | 1     |       | 4     |      | 1     | 12   |       |       | 2     |      | 3  |
| Permitted Phases                                                |                        | 4     |       | 4     |       |      | 2     |      |       | 2     |       |      |    |
| Detector Phase                                                  |                        | 4     | 4     | 1     | 4     | 4    | 1     | 12   |       | 2     | 2     |      |    |
| Switch Phase                                                    |                        |       |       |       |       |      |       |      |       |       |       |      |    |
| Minimum Initial (s)                                             | 9.0                    | 9.0   | 7.0   | 9.0   | 9.0   |      | 7.0   |      | 6.0   | 6.0   |       | 4.0  |    |
| Minimum Split (s)                                               | 14.0                   | 14.0  | 12.0  | 14.0  | 14.0  |      | 12.0  |      | 11.0  | 11.0  |       | 19.0 |    |
| Total Split (s)                                                 | 19.0                   | 19.0  | 25.0  | 19.0  | 19.0  |      | 25.0  |      | 45.0  | 45.0  |       | 19.0 |    |
| Total Split (%)                                                 | 17.6%                  | 17.6% | 23.1% | 17.6% | 17.6% |      | 23.1% |      | 41.7% | 41.7% |       | 18%  |    |
| Yellow Time (s)                                                 | 4.0                    | 4.0   | 4.0   | 4.0   | 4.0   |      | 4.0   |      | 4.0   | 4.0   |       | 4.0  |    |
| All-Red Time (s)                                                | 1.0                    | 1.0   | 1.0   | 1.0   | 1.0   |      | 1.0   |      | 1.0   | 1.0   |       | 0.0  |    |
| Lost Time Adjust (s)                                            |                        | 0.0   | 0.0   |       | 0.0   |      | 0.0   |      |       | 0.0   |       |      |    |
| Total Lost Time (s)                                             |                        | 5.0   | 5.0   |       | 5.0   |      | 5.0   |      |       | 5.0   |       |      |    |
| Lead/Lag                                                        | Lag                    | Lag   | Lead  | Lag   | Lag   | Lead |       |      | Lag   | Lag   | Lead  |      |    |
| Lead-Lag Optimize?                                              |                        |       |       |       |       |      |       |      |       |       |       |      |    |
| Recall Mode                                                     | Min                    | Min   | Max   | Min   | Min   | Max  |       | Max  | Max   | Max   |       | None |    |
| Act Effct Green (s)                                             | 10.6                   | 30.8  |       |       | 10.6  | 60.8 | 65.8  |      |       | 40.5  |       |      |    |
| Actuated g/C Ratio                                              | 0.11                   | 0.32  |       |       | 0.11  | 0.63 | 0.68  |      |       | 0.42  |       |      |    |
| v/c Ratio                                                       | 0.16                   | 0.86  |       |       | 0.47  | 0.84 | 0.60  |      |       | 1.04  |       |      |    |
| Control Delay                                                   | 44.7                   | 48.6  |       |       | 52.5  | 35.4 | 13.4  |      |       | 74.4  |       |      |    |
| Queue Delay                                                     | 0.0                    | 0.0   |       |       | 0.0   | 0.0  | 1.6   |      |       | 0.0   |       |      |    |
| Total Delay                                                     | 44.7                   | 48.6  |       |       | 52.5  | 35.4 | 15.0  |      |       | 74.4  |       |      |    |
| LOS                                                             | D                      | D     |       |       | D     | D    | B     |      |       | E     |       |      |    |
| Approach Delay                                                  | 48.4                   |       |       |       | 52.5  |      | 22.4  |      |       | 74.4  |       |      |    |
| Approach LOS                                                    | D                      |       |       |       | D     |      | C     |      |       | E     |       |      |    |
| Queue Length 50th (ft)                                          | 14                     | 261   |       |       | 52    | 180  | 293   |      |       | ~634  |       |      |    |
| Queue Length 95th (ft)                                          | 40                     | #460  |       |       | 101   | #394 | 471   |      |       | #924  |       |      |    |
| Internal Link Dist (ft)                                         | 544                    |       |       |       | 307   |      | 428   |      |       | 451   |       |      |    |
| Turn Bay Length (ft)                                            |                        | 50    |       |       |       | 75   |       |      |       |       |       |      |    |
| Base Capacity (vph)                                             | 196                    | 508   |       |       | 231   | 511  | 1264  |      |       | 789   |       |      |    |
| Starvation Cap Reductn                                          | 0                      | 0     |       |       | 0     | 0    | 316   |      |       | 0     |       |      |    |
| Spillback Cap Reductn                                           | 0                      | 0     |       |       | 0     | 0    | 0     |      |       | 0     |       |      |    |
| Storage Cap Reductn                                             | 0                      | 0     |       |       | 0     | 0    | 0     |      |       | 0     |       |      |    |
| Reduced v/c Ratio                                               | 0.12                   | 0.86  |       |       | 0.35  | 0.84 | 0.80  |      |       | 1.04  |       |      |    |
| Intersection Summary                                            |                        |       |       |       |       |      |       |      |       |       |       |      |    |
| Area Type:                                                      | Other                  |       |       |       |       |      |       |      |       |       |       |      |    |
| Cycle Length: 108                                               |                        |       |       |       |       |      |       |      |       |       |       |      |    |
| Actuated Cycle Length: 97                                       |                        |       |       |       |       |      |       |      |       |       |       |      |    |
| Natural Cycle: 100                                              |                        |       |       |       |       |      |       |      |       |       |       |      |    |
| Control Type: Semi Act-Uncoord                                  |                        |       |       |       |       |      |       |      |       |       |       |      |    |
| Maximum v/c Ratio: 1.04                                         |                        |       |       |       |       |      |       |      |       |       |       |      |    |
| Intersection Signal Delay: 44.7                                 | Intersection LOS: D    |       |       |       |       |      |       |      |       |       |       |      |    |
| Intersection Capacity Utilization 100.2%                        | ICU Level of Service G |       |       |       |       |      |       |      |       |       |       |      |    |
| Analysis Period (min) 15                                        |                        |       |       |       |       |      |       |      |       |       |       |      |    |
| - Volume exceeds capacity, queue is theoretically infinite.     |                        |       |       |       |       |      |       |      |       |       |       |      |    |
| - Queue shown is maximum after two cycles.                      |                        |       |       |       |       |      |       |      |       |       |       |      |    |
| # 95th percentile volume exceeds capacity, queue may be longer. |                        |       |       |       |       |      |       |      |       |       |       |      |    |
| - Queue shown is maximum after two cycles.                      |                        |       |       |       |       |      |       |      |       |       |       |      |    |

12239.00 :: Needham Street  
17: Centre Street & Walnut Street

2025 Build Conditions - with Shuttle Service  
Timing Plan: Weekday Morning



12239.00 :: Needham Street  
18: Nahanton Street & Winchester Street

2025 Build Conditions - with Shuttle Service  
Timing Plan: Weekday Morning

| Lane Group              | EBL                                                                               | EBT                                                                               | WBT                                                                               | WBR                                                                               | SBL                                                                               | SBR                                                                               |
|-------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|
| Lane Configurations     |  |  |  |  |  |  |
| Traffic Volume (vph)    | 260                                                                               | 535                                                                               | 715                                                                               | 30                                                                                | 40                                                                                | 345                                                                               |
| Future Volume (vph)     | 260                                                                               | 535                                                                               | 715                                                                               | 30                                                                                | 40                                                                                | 345                                                                               |
| Ideal Flow (vphpl)      | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                              |
| Storage Length (ft)     | 175                                                                               |                                                                                   |                                                                                   |                                                                                   | 75                                                                                | 0                                                                                 |
| Storage Lanes           | 1                                                                                 |                                                                                   |                                                                                   |                                                                                   | 1                                                                                 |                                                                                   |
| Taper Length (ft)       | 25                                                                                |                                                                                   |                                                                                   |                                                                                   | 25                                                                                |                                                                                   |
| Satd. Flow (prot)       | 1787                                                                              | 1881                                                                              | 1870                                                                              | 0                                                                                 | 1787                                                                              | 1599                                                                              |
| Flt Permitted           | 0.172                                                                             |                                                                                   |                                                                                   |                                                                                   | 0.950                                                                             |                                                                                   |
| Satd. Flow (perm)       | 324                                                                               | 1881                                                                              | 1870                                                                              | 0                                                                                 | 1787                                                                              | 1599                                                                              |
| Right Turn on Red       |                                                                                   |                                                                                   |                                                                                   | Yes                                                                               |                                                                                   | No                                                                                |
| Satd. Flow (RTOR)       |                                                                                   |                                                                                   | 3                                                                                 |                                                                                   |                                                                                   |                                                                                   |
| Link Speed (mph)        |                                                                                   | 30                                                                                | 30                                                                                |                                                                                   | 30                                                                                |                                                                                   |
| Link Distance (ft)      |                                                                                   | 963                                                                               | 734                                                                               |                                                                                   | 889                                                                               |                                                                                   |
| Travel Time (s)         |                                                                                   | 21.9                                                                              | 16.7                                                                              |                                                                                   | 20.2                                                                              |                                                                                   |
| Peak Hour Factor        | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              |
| Heavy Vehicles (%)      | 1%                                                                                | 1%                                                                                | 1%                                                                                | 1%                                                                                | 1%                                                                                | 1%                                                                                |
| Shared Lane Traffic (%) |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| Lane Group Flow (vph)   | 283                                                                               | 582                                                                               | 810                                                                               | 0                                                                                 | 43                                                                                | 375                                                                               |
| Turn Type               | pm+pt                                                                             | NA                                                                                | NA                                                                                |                                                                                   | Prot                                                                              | pt+ov                                                                             |
| Protected Phases        | 5                                                                                 | 2                                                                                 | 6                                                                                 |                                                                                   | 8                                                                                 | 5/8                                                                               |
| Permitted Phases        | 2                                                                                 |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| Detector Phase          | 5                                                                                 | 2                                                                                 | 6                                                                                 |                                                                                   | 8                                                                                 | 5/8                                                                               |
| Switch Phase            |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| Minimum Initial (s)     | 6.0                                                                               | 10.0                                                                              | 10.0                                                                              |                                                                                   | 6.0                                                                               |                                                                                   |
| Minimum Split (s)       | 11.0                                                                              | 15.0                                                                              | 23.0                                                                              |                                                                                   | 10.0                                                                              |                                                                                   |
| Total Split (s)         | 29.0                                                                              | 100.0                                                                             | 71.0                                                                              |                                                                                   | 15.0                                                                              |                                                                                   |
| Total Split (%)         | 25.2%                                                                             | 87.0%                                                                             | 61.7%                                                                             |                                                                                   | 13.0%                                                                             |                                                                                   |
| Yellow Time (s)         | 3.0                                                                               | 3.0                                                                               | 3.0                                                                               |                                                                                   | 3.0                                                                               |                                                                                   |
| All-Red Time (s)        | 2.0                                                                               | 2.0                                                                               | 2.0                                                                               |                                                                                   | 1.0                                                                               |                                                                                   |
| Lost Time Adjust (s)    | 0.0                                                                               | 0.0                                                                               | 0.0                                                                               |                                                                                   | 0.0                                                                               |                                                                                   |
| Total Lost Time (s)     | 5.0                                                                               | 5.0                                                                               | 5.0                                                                               |                                                                                   | 4.0                                                                               |                                                                                   |
| Lead/Lag                | Lead                                                                              |                                                                                   | Lag                                                                               |                                                                                   |                                                                                   |                                                                                   |
| Lead-Lag Optimize?      | Yes                                                                               |                                                                                   | Yes                                                                               |                                                                                   |                                                                                   |                                                                                   |
| Recall Mode             | None                                                                              | C-Min                                                                             | None                                                                              |                                                                                   | None                                                                              |                                                                                   |
| Act Effct Green (s)     | 88.8                                                                              | 88.8                                                                              | 68.3                                                                              |                                                                                   | 17.2                                                                              | 36.7                                                                              |
| Actuated g/C Ratio      | 0.77                                                                              | 0.77                                                                              | 0.59                                                                              |                                                                                   | 0.15                                                                              | 0.32                                                                              |
| v/c Ratio               | 0.63                                                                              | 0.40                                                                              | 0.73                                                                              |                                                                                   | 0.16                                                                              | 0.74                                                                              |
| Control Delay           | 12.5                                                                              | 5.1                                                                               | 22.2                                                                              |                                                                                   | 47.0                                                                              | 44.1                                                                              |
| Queue Delay             | 0.0                                                                               | 0.0                                                                               | 0.0                                                                               |                                                                                   | 0.0                                                                               | 0.0                                                                               |
| Total Delay             | 12.5                                                                              | 5.1                                                                               | 22.2                                                                              |                                                                                   | 47.0                                                                              | 44.1                                                                              |
| LOS                     | B                                                                                 | A                                                                                 | C                                                                                 |                                                                                   | D                                                                                 | D                                                                                 |
| Approach Delay          |                                                                                   | 7.5                                                                               | 22.2                                                                              |                                                                                   | 44.4                                                                              |                                                                                   |
| Approach LOS            |                                                                                   | A                                                                                 | C                                                                                 |                                                                                   | D                                                                                 |                                                                                   |
| Queue Length 50th (ft)  |                                                                                   | 57                                                                                | 142                                                                               | 399                                                                               | 27                                                                                | 248                                                                               |
| Queue Length 95th (ft)  |                                                                                   | 94                                                                                | 115                                                                               | 594                                                                               | 67                                                                                | 352                                                                               |
| Internal Link Dist (ft) |                                                                                   |                                                                                   | 883                                                                               | 654                                                                               | 809                                                                               |                                                                                   |
| Turn Bay Length (ft)    |                                                                                   | 175                                                                               |                                                                                   |                                                                                   | 75                                                                                |                                                                                   |
| Base Capacity (vph)     |                                                                                   | 555                                                                               | 1553                                                                              | 1114                                                                              | 267                                                                               | 628                                                                               |
| Starvation Cap Reductn  |                                                                                   | 0                                                                                 | 0                                                                                 | 0                                                                                 | 0                                                                                 | 0                                                                                 |
| Spillback Cap Reductn   |                                                                                   | 0                                                                                 | 0                                                                                 | 0                                                                                 | 0                                                                                 | 0                                                                                 |
| Storage Cap Reductn     |                                                                                   | 0                                                                                 | 0                                                                                 | 0                                                                                 | 0                                                                                 | 0                                                                                 |
| Reduced v/c Ratio       |                                                                                   | 0.51                                                                              | 0.37                                                                              | 0.73                                                                              | 0.16                                                                              | 0.60                                                                              |

Intersection Summary

Area Type: Other  
Cycle Length: 115  
Actuated Cycle Length: 115  
Offset: 8 (7%), Referenced to phase 2:EBTL, Start of Green  
Natural Cycle: 60  
Control Type: Actuated-Coordinated  
Maximum v/c Ratio: 0.74  
Intersection Signal Delay: 20.5  
Intersection Capacity Utilization 70.5%  
Analysis Period (min) 15

Splits and Phases: 18: Nahanton Street & Winchester Street



Lanes, Volumes, Timings  
VHB/MSD  
\\vhb\proj\Wat-LD\12239.00\tech\Traffic\Synchro\TIA\_2018\2025 BD\_AM\_AGGRESSIVE.syn  
07/03/2018

12239.00 :: Needham Street  
19: Wells Avenue/JCC Driveway & Nahanton Street

2025 Build Conditions - with Shuttle Service  
Timing Plan: Weekday Morning

| Lane Group              | EBL                                                                                 | EBT                                                                                 | EBR                                                                                 | WBL                                                                                 | WBT                                                                                 | WBR                                                                                 | NBL                                                                                 | NBT                                                                                 | NBR                                                                                 | SBL                                                                                 | SBT                                                                                 | SBR                                                                                 |
|-------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
| Lane Configurations     |  |  |  |  |  |  |  |  |  |  |  |  |
| Traffic Volume (vph)    | 65                                                                                  | 590                                                                                 | 370                                                                                 | 385                                                                                 | 515                                                                                 | 160                                                                                 | 110                                                                                 | 15                                                                                  | 140                                                                                 | 65                                                                                  | 10                                                                                  | 50                                                                                  |
| Future Volume (vph)     | 65                                                                                  | 590                                                                                 | 370                                                                                 | 385                                                                                 | 515                                                                                 | 160                                                                                 | 110                                                                                 | 15                                                                                  | 140                                                                                 | 65                                                                                  | 10                                                                                  | 50                                                                                  |
| Ideal Flow (vphpl)      | 1900                                                                                | 1900                                                                                | 1900                                                                                | 1900                                                                                | 1900                                                                                | 1900                                                                                | 1900                                                                                | 1900                                                                                | 1900                                                                                | 1900                                                                                | 1900                                                                                | 1900                                                                                |
| Storage Length (ft)     | 125                                                                                 |                                                                                     | 125                                                                                 | 150                                                                                 |                                                                                     | 0                                                                                   | 0                                                                                   | 0                                                                                   | 0                                                                                   | 75                                                                                  |                                                                                     | 0                                                                                   |
| Storage Lanes           | 1                                                                                   |                                                                                     | 1                                                                                   |                                                                                     |                                                                                     | 0                                                                                   | 1                                                                                   |                                                                                     |                                                                                     | 0                                                                                   |                                                                                     | 1                                                                                   |
| Taper Length (ft)       | 25                                                                                  |                                                                                     | 25                                                                                  |                                                                                     |                                                                                     | 0                                                                                   | 25                                                                                  |                                                                                     |                                                                                     | 25                                                                                  |                                                                                     | 0                                                                                   |
| Satd. Flow (prot)       | 1787                                                                                | 1881                                                                                | 1599                                                                                | 1805                                                                                | 1832                                                                                | 0                                                                                   | 1787                                                                                |                                                                                     | 1625                                                                                | 0                                                                                   | 1805                                                                                | 1662                                                                                |
| Flt Permitted           | 0.203                                                                               |                                                                                     |                                                                                     | 0.270                                                                               |                                                                                     | 0.715                                                                               |                                                                                     |                                                                                     | 0.546                                                                               |                                                                                     |                                                                                     |                                                                                     |
| Satd. Flow (perm)       | 382                                                                                 | 1881                                                                                | 1599                                                                                | 513                                                                                 | 1832                                                                                | 0                                                                                   | 1345                                                                                |                                                                                     | 1625                                                                                | 0                                                                                   | 1037                                                                                | 1662                                                                                |
| Right Turn on Red       |                                                                                     |                                                                                     | Yes                                                                                 |                                                                                     |                                                                                     | Yes                                                                                 |                                                                                     |                                                                                     | Yes                                                                                 |                                                                                     |                                                                                     | Yes                                                                                 |
| Satd. Flow (RTOR)       |                                                                                     |                                                                                     | 330                                                                                 |                                                                                     | 27                                                                                  |                                                                                     |                                                                                     |                                                                                     | 152                                                                                 |                                                                                     |                                                                                     | 54                                                                                  |
| Link Speed (mph)        |                                                                                     | 30                                                                                  |                                                                                     |                                                                                     | 30                                                                                  |                                                                                     |                                                                                     |                                                                                     | 30                                                                                  |                                                                                     |                                                                                     | 30                                                                                  |
| Link Distance (ft)      |                                                                                     | 797                                                                                 |                                                                                     |                                                                                     | 963                                                                                 |                                                                                     |                                                                                     |                                                                                     | 598                                                                                 |                                                                                     |                                                                                     | 628                                                                                 |
| Travel Time (s)         |                                                                                     | 18.1                                                                                |                                                                                     |                                                                                     | 21.9                                                                                |                                                                                     |                                                                                     |                                                                                     | 13.6                                                                                |                                                                                     |                                                                                     | 14.3                                                                                |
| Peak Hour Factor        | 0.92                                                                                | 0.92                                                                                | 0.92                                                                                | 0.92                                                                                | 0.92                                                                                | 0.92                                                                                | 0.92                                                                                | 0.92                                                                                | 0.92                                                                                | 0.92                                                                                | 0.92                                                                                | 0.92                                                                                |
| Heavy Vehicles (%)      | 1%                                                                                  | 1%                                                                                  | 1%                                                                                  | 0%                                                                                  | 0%                                                                                  | 0%                                                                                  | 1%                                                                                  | 1%                                                                                  | 1%                                                                                  | 0%                                                                                  | 0%                                                                                  | 0%                                                                                  |
| Shared Lane Traffic (%) |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Lane Group Flow (vph)   | 71                                                                                  | 641                                                                                 | 402                                                                                 | 418                                                                                 | 734                                                                                 | 0                                                                                   | 120                                                                                 | 168                                                                                 | 0                                                                                   | 71                                                                                  | 65                                                                                  | 0                                                                                   |
| Turn Type               | pm+pt                                                                               | NA                                                                                  | Perm                                                                                | pm+pt                                                                               | NA                                                                                  |                                                                                     | Perm                                                                                | NA                                                                                  |                                                                                     | Perm                                                                                | NA                                                                                  |                                                                                     |
| Protected Phases        | 3                                                                                   | 1                                                                                   | 3                                                                                   | 1                                                                                   |                                                                                     |                                                                                     | 2                                                                                   |                                                                                     |                                                                                     | 2                                                                                   |                                                                                     |                                                                                     |
| Permitted Phases        | 1                                                                                   |                                                                                     | 1                                                                                   | 1                                                                                   |                                                                                     |                                                                                     | 2                                                                                   |                                                                                     |                                                                                     | 2                                                                                   |                                                                                     |                                                                                     |
| Detector Phase          | 3                                                                                   | 1                                                                                   | 1                                                                                   | 3                                                                                   | 1                                                                                   |                                                                                     | 2                                                                                   |                                                                                     |                                                                                     | 2                                                                                   |                                                                                     |                                                                                     |
| Switch Phase            |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Minimum Initial (s)     | 6.0                                                                                 | 6.0                                                                                 | 6.0                                                                                 | 6.0                                                                                 | 6.0                                                                                 |                                                                                     | 6.0                                                                                 | 6.0                                                                                 |                                                                                     | 6.0                                                                                 | 6.0                                                                                 |                                                                                     |
| Minimum Split (s)       | 10.0                                                                                | 11.0                                                                                | 11.0                                                                                | 10.0                                                                                | 11.0                                                                                |                                                                                     | 11.0                                                                                | 11.0                                                                                |                                                                                     | 11.0                                                                                | 11.0                                                                                |                                                                                     |
| Total Split (s)         | 16.0                                                                                | 55.0                                                                                | 55.0                                                                                | 16.0                                                                                | 55.0                                                                                |                                                                                     | 20.0                                                                                | 20.0                                                                                |                                                                                     | 20.0                                                                                | 20.0                                                                                |                                                                                     |
| Total Split (%)         | 17.6%                                                                               | 60.4%                                                                               | 60.4%                                                                               | 17.6%                                                                               | 60.4%                                                                               |                                                                                     | 22.0%                                                                               | 22.0%                                                                               |                                                                                     | 22.0%                                                                               | 22.0%                                                                               |                                                                                     |
| Yellow Time (s)         | 3.0                                                                                 | 3.0                                                                                 | 3.0                                                                                 | 3.0                                                                                 | 3.0                                                                                 |                                                                                     | 3.0                                                                                 | 3.0                                                                                 |                                                                                     | 3.0                                                                                 | 3.0                                                                                 |                                                                                     |
| All-Red Time (s)        | 1.0                                                                                 | 2.0                                                                                 | 2.0                                                                                 | 1.0                                                                                 | 2.0                                                                                 |                                                                                     | 2.0                                                                                 | 2.0                                                                                 |                                                                                     | 2.0                                                                                 | 2.0                                                                                 |                                                                                     |
| Lost Time Adjust (s)    | 0.0                                                                                 | 0.0                                                                                 | 0.0                                                                                 | 0.0                                                                                 | 0.0                                                                                 |                                                                                     | 0.0                                                                                 | 0.0                                                                                 |                                                                                     | 0.0                                                                                 | 0.0                                                                                 |                                                                                     |
| Total Lost Time (s)     | 4.0                                                                                 | 5.0                                                                                 | 5.0                                                                                 | 4.0                                                                                 | 5.0                                                                                 |                                                                                     | 5.0                                                                                 | 5.0                                                                                 |                                                                                     | 5.0                                                                                 | 5.0                                                                                 |                                                                                     |
| Lead/Lag                | Lead                                                                                |                                                                                     | Lead                                                                                |                                                                                     | Lead                                                                                |                                                                                     | Lag                                                                                 | Lag                                                                                 |                                                                                     | Lag                                                                                 | Lag                                                                                 |                                                                                     |
| Lead-Lag Optimize?      |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Recall Mode             | None                                                                                | None                                                                                | None                                                                                | None                                                                                | None                                                                                |                                                                                     | None                                                                                | None                                                                                |                                                                                     | None                                                                                | None                                                                                |                                                                                     |
| Act Effct Green (s)     | 53.1                                                                                | 41.3                                                                                | 41.3                                                                                | 53.1                                                                                | 41.3                                                                                |                                                                                     | 11.1                                                                                | 11.1                                                                                |                                                                                     | 11.1                                                                                | 11.1                                                                                |                                                                                     |
| Actuated g/C Ratio      | 0.68                                                                                | 0.53                                                                                | 0.53                                                                                | 0.68                                                                                | 0.53                                                                                |                                                                                     | 0.14                                                                                | 0.14                                                                                |                                                                                     | 0.14                                                                                | 0.14                                                                                |                                                                                     |
| v/c Ratio               | 0.16                                                                                | 0.64                                                                                | 0.40                                                                                | 0.79                                                                                | 0.75                                                                                |                                                                                     | 0.63                                                                                | 0.47                                                                                |                                                                                     | 0.48                                                                                | 0.23                                                                                |                                                                                     |
| Control Delay           | 4.0                                                                                 | 16.7                                                                                | 3.6                                                                                 | 18.8                                                                                | 19.4                                                                                |                                                                                     | 50.1                                                                                | 12.6                                                                                |                                                                                     | 45.7                                                                                | 14.8                                                                                |                                                                                     |
| Queue Delay             | 0.0                                                                                 | 0.0                                                                                 | 0.0                                                                                 | 0.0                                                                                 | 0.0                                                                                 |                                                                                     | 0.0                                                                                 | 0.0                                                                                 |                                                                                     | 0.0                                                                                 | 0.0                                                                                 |                                                                                     |
| Total Delay             | 4.0                                                                                 | 16.7                                                                                | 3.6                                                                                 | 18.8                                                                                | 19.4                                                                                |                                                                                     | 50.1                                                                                | 12.6                                                                                |                                                                                     | 45.7                                                                                | 14.8                                                                                |                                                                                     |
| LOS                     | A                                                                                   | B                                                                                   | A                                                                                   | B                                                                                   | B                                                                                   |                                                                                     | D                                                                                   | B                                                                                   |                                                                                     | D                                                                                   | B                                                                                   |                                                                                     |
| Approach Delay          |                                                                                     | 11.1                                                                                |                                                                                     |                                                                                     | 19.1                                                                                |                                                                                     |                                                                                     | 28.2                                                                                |                                                                                     |                                                                                     | 30.9                                                                                |                                                                                     |
| Approach LOS            |                                                                                     | B                                                                                   |                                                                                     |                                                                                     | B                                                                                   |                                                                                     |                                                                                     | C                                                                                   |                                                                                     |                                                                                     | C                                                                                   |                                                                                     |
| Queue Length 50th (ft)  |                                                                                     | 8                                                                                   | 215                                                                                 | 17                                                                                  | 57                                                                                  | 259                                                                                 |                                                                                     | 64                                                                                  |                                                                                     | 8                                                                                   | 37                                                                                  |                                                                                     |
| Queue Length 95th (ft)  |                                                                                     | 19                                                                                  | 349                                                                                 | 61                                                                                  | #133                                                                                | 428                                                                                 |                                                                                     | 121                                                                                 |                                                                                     | 63                                                                                  | 80                                                                                  |                                                                                     |
| Internal Link Dist (ft) |                                                                                     |                                                                                     | 717                                                                                 |                                                                                     | 883                                                                                 |                                                                                     |                                                                                     | 518                                                                                 |                                                                                     |                                                                                     | 548                                                                                 |                                                                                     |
| Turn Bay Length (ft)    |                                                                                     | 125                                                                                 |                                                                                     | 125                                                                                 | 150                                                                                 |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     | 75                                                                                  |                                                                                     |
| Base Capacity (vph)     |                                                                                     | 497                                                                                 | 1272                                                                                | 1188                                                                                | 571                                                                                 | 1248                                                                                |                                                                                     | 272                                                                                 | 450                                                                                 |                                                                                     | 210                                                                                 | 380                                                                                 |
| Starvation Cap Reductn  |                                                                                     | 0                                                                                   | 0                                                                                   | 0                                                                                   | 0                                                                                   | 0                                                                                   |                                                                                     | 0                                                                                   | 0                                                                                   |                                                                                     | 0                                                                                   | 0                                                                                   |
| Spillback Cap Reductn   |                                                                                     | 0                                                                                   | 0                                                                                   | 0                                                                                   | 0                                                                                   | 0                                                                                   |                                                                                     | 0                                                                                   | 0                                                                                   |                                                                                     | 0                                                                                   | 0                                                                                   |
| Storage Cap Reductn     |                                                                                     | 0                                                                                   | 0                                                                                   | 0                                                                                   | 0                                                                                   | 0                                                                                   |                                                                                     | 0                                                                                   | 0                                                                                   |                                                                                     | 0                                                                                   | 0                                                                                   |
| Reduced v/c Ratio       |                                                                                     | 0.14                                                                                | 0.50                                                                                | 0.34                                                                                | 0.73                                                                                | 0.59                                                                                |                                                                                     | 0.44                                                                                | 0.37                                                                                |                                                                                     | 0.34                                                                                | 0.17                                                                                |

Intersection Summary

Area Type: Other  
Cycle Length: 91  
Actuated Cycle Length: 77.8  
Natural Cycle: 60  
Control Type: Actuated-Uncoordinated  
Maximum v/c Ratio: 0.79  
Intersection Signal Delay: 17.4  
Intersection Capacity Utilization 82.7%  
Analysis Period (min) 15  
# 95th percentile volume exceeds capacity, queue may be longer.  
Queue shown is maximum after two cycles.

Splits and Phases: 19: Wells Avenue/JCC Driveway & Nahanton Street



Lanes, Volumes, Timings  
VHB/MSD  
\\vhb\proj\Wat-LD\12239.00\tech\Traffic\Synchro\TIA\_2018\2025 BD\_AM\_AGGRESSIVE.syn  
07/03/2018

12239.00 :: Needham Street  
20: Highland Avenue & Riverside Street

2025 Build Conditions - with Shuttle Service  
Timing Plan: Weekday Morning

| Intersection             |        |       |        |       |        |      |
|--------------------------|--------|-------|--------|-------|--------|------|
| Int Delay, s/veh         | 0.6    |       |        |       |        |      |
| Movement                 | NWL    | NWR   | NET    | NER   | SWL    | SWT  |
| Lane Configurations      | ↔      |       | ↕↕     |       |        | ↕    |
| Traffic Vol, veh/h       | 10     | 1     | 1035   | 5     | 1      | 985  |
| Future Vol, veh/h        | 10     | 1     | 1035   | 5     | 1      | 985  |
| Conflicting Peds, #/hr   | 0      | 1     | 0      | 3     | 3      | 0    |
| Sign Control             | Stop   | Stop  | Free   | Free  | Free   | Free |
| RT Channelized           | -      | None  | -      | None  | -      | None |
| Storage Length           | 0      | -     | -      | -     | -      | -    |
| Veh in Median Storage, # | 0      | -     | 0      | -     | -      | 0    |
| Grade, %                 | 0      | -     | 0      | -     | -      | 0    |
| Peak Hour Factor         | 92     | 92    | 92     | 92    | 92     | 92   |
| Heavy Vehicles, %        | 0      | 0     | 1      | 1     | 1      | 1    |
| Mvmt Flow                | 11     | 1     | 1125   | 5     | 1      | 1071 |
| Major/Minor              |        |       |        |       |        |      |
| Minor1                   | Major1 |       | Major2 |       |        |      |
| Conflicting Flow All     | 2204   | 569   | 0      | 0     | 1133   | 0    |
| Stage 1                  | 1131   | -     | -      | -     | -      | -    |
| Stage 2                  | 1073   | -     | -      | -     | -      | -    |
| Critical Hdwy            | 6.6    | 6.9   | -      | -     | 4.115  | -    |
| Critical Hdwy Stg 1      | 5.8    | -     | -      | -     | -      | -    |
| Critical Hdwy Stg 2      | 5.4    | -     | -      | -     | -      | -    |
| Follow-up Hdwy           | 3.5    | 3.3   | -      | -     | 2.2095 | -    |
| Pot Cap-1 Maneuver       | 44     | 470   | -      | -     | 619    | -    |
| Stage 1                  | 274    | -     | -      | -     | -      | -    |
| Stage 2                  | 331    | -     | -      | -     | -      | -    |
| Platoon blocked, %       | -      | -     | -      | -     | -      | -    |
| Mov Cap-1 Maneuver       | 44     | 468   | -      | -     | 618    | -    |
| Mov Cap-2 Maneuver       | 44     | -     | -      | -     | -      | -    |
| Stage 1                  | 273    | -     | -      | -     | -      | -    |
| Stage 2                  | 330    | -     | -      | -     | -      | -    |
| Approach                 |        |       |        |       |        |      |
| NW                       | NE     |       | SW     |       |        |      |
| HCM Control Delay, s     | 103.3  | 0     | 0      | 0     | 0      | 0    |
| HCM LOS                  | F      |       |        |       |        |      |
| Minor Lane/Major Mvmt    |        |       |        |       |        |      |
| NET                      | NER    | NWLn1 | SWL    | SWT   |        |      |
| Capacity (veh/h)         | -      | -     | 48     | 618   | -      | -    |
| HCM Lane V/C Ratio       | -      | -     | 0.249  | 0.002 | -      | -    |
| HCM Control Delay (s)    | -      | -     | 103.3  | 10.8  | 0      | -    |
| HCM Lane LOS             | -      | -     | F      | B     | A      | -    |
| HCM 95th %ile Q(veh)     | -      | -     | 0.8    | 0     | -      | -    |

12239.00 :: Needham Street  
21: Highland Avenue & Highland Terrace/Highland Circle

2025 Build Conditions - with Shuttle Service  
Timing Plan: Weekday Morning

| Intersection             |        |      |       |        |       |       |        |      |      |      |      |      |  |
|--------------------------|--------|------|-------|--------|-------|-------|--------|------|------|------|------|------|--|
| Int Delay, s/veh         | 0.3    |      |       |        |       |       |        |      |      |      |      |      |  |
| Movement                 | SEL    | SET  | SER   | NWL    | NWT   | NWR   | NEL    | NET  | NER  | SWL  | SWT  | SWR  |  |
| Lane Configurations      |        | ↕    |       |        | ↕     |       |        | ↕↕   |      |      | ↕↕   |      |  |
| Traffic Vol, veh/h       | 1      | 0    | 5     | 5      | 0     | 5     | 5      | 1035 | 5    | 2    | 990  | 5    |  |
| Future Vol, veh/h        | 1      | 0    | 5     | 5      | 0     | 5     | 5      | 1035 | 5    | 2    | 990  | 5    |  |
| Conflicting Peds, #/hr   | 0      | 0    | 0     | 0      | 0     | 0     | 4      | 0    | 2    | 2    | 0    | 4    |  |
| Sign Control             | Stop   | Stop | Stop  | Stop   | Stop  | Stop  | Free   | Free | Free | Free | Free | Free |  |
| RT Channelized           | -      | -    | None  | -      | -     | None  | -      | -    | None | -    | -    | None |  |
| Storage Length           | -      | -    | -     | -      | -     | -     | -      | -    | -    | -    | -    | -    |  |
| Veh in Median Storage, # | -      | 0    | -     | -      | 0     | -     | -      | 0    | -    | -    | 0    | -    |  |
| Grade, %                 | -      | 0    | -     | -      | 0     | -     | -      | 0    | -    | -    | 0    | -    |  |
| Peak Hour Factor         | 92     | 92   | 92    | 92     | 92    | 92    | 92     | 92   | 92   | 92   | 92   | 92   |  |
| Heavy Vehicles, %        | 0      | 0    | 0     | 0      | 0     | 0     | 1      | 1    | 1    | 1    | 1    | 1    |  |
| Mvmt Flow                | 1      | 0    | 5     | 5      | 0     | 5     | 5      | 1125 | 5    | 2    | 1076 | 5    |  |
| Major/Minor              |        |      |       |        |       |       |        |      |      |      |      |      |  |
| Minor2                   | Minor1 |      |       | Major1 |       |       | Major2 |      |      |      |      |      |  |
| Conflicting Flow All     | 1660   | 2230 | 545   | 1683   | 2231  | 567   | 1086   | 0    | 0    | 1132 | 0    | 0    |  |
| Stage 1                  | 1087   | 1087 | -     | 1141   | 1141  | -     | -      | -    | -    | -    | -    | -    |  |
| Stage 2                  | 573    | 1143 | -     | 542    | 1090  | -     | -      | -    | -    | -    | -    | -    |  |
| Critical Hdwy            | 7.5    | 6.5  | 6.9   | 7.5    | 6.5   | 6.9   | 4.12   | -    | -    | 4.12 | -    | -    |  |
| Critical Hdwy Stg 1      | 6.5    | 5.5  | -     | 6.5    | 5.5   | -     | -      | -    | -    | -    | -    | -    |  |
| Critical Hdwy Stg 2      | 6.5    | 5.5  | -     | 6.5    | 5.5   | -     | -      | -    | -    | -    | -    | -    |  |
| Follow-up Hdwy           | 3.5    | 4    | 3.3   | 3.5    | 4     | 3.3   | 2.21   | -    | -    | 2.21 | -    | -    |  |
| Pot Cap-1 Maneuver       | 65     | 43   | 488   | 63     | 43    | 472   | 644    | -    | -    | 619  | -    | -    |  |
| Stage 1                  | 234    | 295  | -     | 217    | 278   | -     | -      | -    | -    | -    | -    | -    |  |
| Stage 2                  | 477    | 277  | -     | 497    | 294   | -     | -      | -    | -    | -    | -    | -    |  |
| Platoon blocked, %       | -      | -    | -     | -      | -     | -     | -      | -    | -    | -    | -    | -    |  |
| Mov Cap-1 Maneuver       | 63     | 42   | 486   | 61     | 42    | 471   | 644    | -    | -    | 619  | -    | -    |  |
| Mov Cap-2 Maneuver       | 63     | 42   | -     | 61     | 42    | -     | -      | -    | -    | -    | -    | -    |  |
| Stage 1                  | 228    | 292  | -     | 212    | 272   | -     | -      | -    | -    | -    | -    | -    |  |
| Stage 2                  | 462    | 271  | -     | 488    | 291   | -     | -      | -    | -    | -    | -    | -    |  |
| Approach                 |        |      |       |        |       |       |        |      |      |      |      |      |  |
| SE                       | NW     |      |       | NE     |       |       | SW     |      |      |      |      |      |  |
| HCM Control Delay, s     | 21.2   | 42   | 0.1   | 42     | 0.1   | 0     | 0      | 0    | 0    | 0    | 0    | 0    |  |
| HCM LOS                  | C      | E    |       | E      |       |       |        |      |      |      |      |      |  |
| Minor Lane/Major Mvmt    |        |      |       |        |       |       |        |      |      |      |      |      |  |
| NEL                      | NET    | NER  | NWLn1 | SELn1  | SWL   | SWT   | SWR    |      |      |      |      |      |  |
| Capacity (veh/h)         | 644    | -    | -     | 108    | 229   | 619   | -      | -    | -    | -    | -    | -    |  |
| HCM Lane V/C Ratio       | 0.008  | -    | -     | 0.101  | 0.028 | 0.004 | -      | -    | -    | -    | -    | -    |  |
| HCM Control Delay (s)    | 10.6   | 0.1  | -     | 42     | 21.2  | 10.8  | 0      | -    | -    | -    | -    | -    |  |
| HCM Lane LOS             | B      | A    | -     | E      | C     | B     | A      | -    | -    | -    | -    | -    |  |
| HCM 95th %ile Q(veh)     | 0      | -    | -     | 0.3    | 0.1   | 0     | -      | -    | -    | -    | -    | -    |  |

12239.00 :: Needham Street  
22: 2nd Avenue/Staples Driveway & Highland Avenue

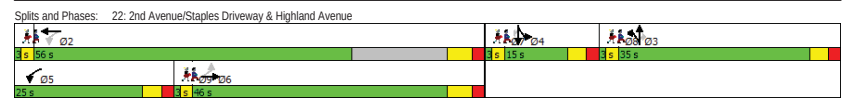
2025 Build Conditions - with Shuttle Service  
Timing Plan: Weekday Morning

| Lane Group              | EBL   | EBT   | EBR  | WBL   | WBT   | WBR  | NBL   | NBT   | NBR   | SBL   | SBT   | SBR   | Ø1   | Ø7   | Ø8   | Ø9   |
|-------------------------|-------|-------|------|-------|-------|------|-------|-------|-------|-------|-------|-------|------|------|------|------|
| Lane Configurations     | EBL   | EBT   | EBR  | WBL   | WBT   | WBR  | NBL   | NBT   | NBR   | SBL   | SBT   | SBR   |      |      |      |      |
| Traffic Volume (vph)    | 5     | 820   | 245  | 325   | 655   | 20   | 175   | 10    | 175   | 20    | 10    | 0     |      |      |      |      |
| Future Volume (vph)     | 5     | 820   | 245  | 325   | 655   | 20   | 175   | 10    | 175   | 20    | 10    | 0     |      |      |      |      |
| Ideal Flow (vphpl)      | 1900  | 1900  | 1900 | 1900  | 1900  | 1900 | 1900  | 1900  | 1900  | 1900  | 1900  | 1900  |      |      |      |      |
| Storage Length (ft)     | 100   |       | 0    | 100   |       | 0    | 150   |       | 100   |       | 0     | 50    |      |      |      |      |
| Storage Lanes           | 1     |       | 0    |       |       | 0    | 1     |       | 1     |       | 0     | 1     |      |      |      |      |
| Taper Length (ft)       | 25    |       |      | 25    |       |      | 25    |       |       | 25    |       |       |      |      |      |      |
| Satd. Flow (prot)       | 1787  | 3434  | 0    | 0     | 3504  | 0    | 1681  | 1694  | 1583  | 0     | 1839  | 1900  |      |      |      |      |
| Flt Permitted           | 0.208 |       |      |       | 0.512 |      | 0.950 | 0.957 |       | 0.968 |       |       |      |      |      |      |
| Satd. Flow (perm)       | 390   | 3434  | 0    | 0     | 1823  | 0    | 1678  | 1691  | 1544  | 0     | 1825  | 1900  |      |      |      |      |
| Right Turn on Red       |       |       | Yes  |       |       | Yes  |       | Yes   |       |       | Yes   |       |      |      |      |      |
| Satd. Flow (RTOR)       |       | 31    |      |       | 2     |      |       | 190   |       |       |       |       |      |      |      |      |
| Link Speed (mph)        |       | 30    |      |       | 30    |      |       | 30    |       |       | 30    |       |      |      |      |      |
| Link Distance (ft)      |       | 210   |      |       | 361   |      |       | 859   |       |       | 290   |       |      |      |      |      |
| Travel Time (s)         |       | 4.8   |      |       | 8.2   |      |       | 19.5  |       |       | 6.6   |       |      |      |      |      |
| Confl. Peds. (#/hr)     | 3     |       | 1    | 1     |       | 3    | 1     |       | 6     | 6     |       | 1     |      |      |      |      |
| Confl. Bikes (#/hr)     |       |       | 1    |       |       |      |       |       |       |       |       |       |      |      |      |      |
| Peak Hour Factor        | 0.92  | 0.92  | 0.92 | 0.92  | 0.92  | 0.92 | 0.92  | 0.92  | 0.92  | 0.92  | 0.92  | 0.92  |      |      |      |      |
| Heavy Vehicles (%)      | 1%    | 1%    | 1%   | 1%    | 1%    | 1%   |       | 2%    | 2%    | 0%    | 0%    | 0%    |      |      |      |      |
| Shared Lane Traffic (%) |       |       |      |       |       |      | 47%   |       |       |       |       |       |      |      |      |      |
| Lane Group Flow (vph)   | 5     | 1157  | 0    | 0     | 1087  | 0    | 101   | 100   | 190   | 0     | 33    | 0     |      |      |      |      |
| Turn Type               | Perm  | NA    |      | pm+pt | NA    |      | Split | NA    | Perm  | Split | NA    | Perm  |      |      |      |      |
| Protected Phases        |       | 6     |      | 5     | 2     |      | 3     | 3     |       | 4     | 4     |       | 1    | 7    | 8    | 9    |
| Permitted Phases        | 6     |       |      | 2     |       |      |       | 3     |       |       |       | 4     |      |      |      |      |
| Detector Phase          | 6     | 6     |      | 5     | 2     |      | 3     | 3     | 3     | 4     | 4     |       |      |      |      |      |
| Switch Phase            |       |       |      |       |       |      |       |       |       |       |       |       |      |      |      |      |
| Minimum Initial (s)     | 15.0  | 15.0  |      | 4.0   | 15.0  |      | 10.0  | 10.0  | 10.0  | 4.0   | 4.0   | 4.0   | 1.0  | 1.0  | 1.0  | 1.0  |
| Minimum Split (s)       | 31.0  | 31.0  |      | 9.0   | 23.0  |      | 23.0  | 23.0  | 23.0  | 26.0  | 26.0  | 26.0  | 3.0  | 3.0  | 3.0  | 3.0  |
| Total Split (s)         | 46.0  | 46.0  |      | 25.0  | 56.0  |      | 35.0  | 35.0  | 35.0  | 15.0  | 15.0  | 15.0  | 3.0  | 3.0  | 3.0  | 3.0  |
| Total Split (%)         | 35.4% | 35.4% |      | 19.2% | 43.1% |      | 26.9% | 26.9% | 26.9% | 11.5% | 11.5% | 11.5% | 2%   | 2%   | 2%   | 2%   |
| Yellow Time (s)         | 4.0   | 4.0   |      | 3.0   | 4.0   |      | 3.0   | 3.0   | 3.0   | 3.0   | 3.0   | 3.0   | 2.0  | 2.0  | 2.0  | 2.0  |
| All-Red Time (s)        | 2.0   | 2.0   |      | 2.0   | 2.0   |      | 2.0   | 2.0   | 2.0   | 2.0   | 2.0   | 2.0   | 0.0  | 0.0  | 0.0  | 0.0  |
| Lost Time Adjust (s)    | 0.0   | 0.0   |      |       | 0.0   |      | 0.0   | 0.0   | 0.0   |       | 0.0   | 0.0   |      |      |      |      |
| Total Lost Time (s)     | 6.0   | 6.0   |      |       | 6.0   |      | 5.0   | 5.0   | 5.0   |       | 5.0   | 5.0   |      |      |      |      |
| Lead/Lag                |       |       |      | Lead  | Lag   |      | Lag   | Lag   | Lag   | Lag   | Lag   | Lag   | Lead | Lead | Lead | Lag  |
| Lead-Lag Optimize?      |       |       |      |       |       |      |       |       |       |       |       |       |      |      |      |      |
| Recall Mode             | None  | None  |      | None  | None  |      | None  | None  | None  | None  | None  | None  | None | None | None | None |
| Act Effect Green (s)    | 46.0  | 46.0  |      | 46.0  | 46.0  |      | 12.0  | 12.0  | 12.0  |       | 8.0   |       |      |      |      |      |
| Actuated g/C Ratio      | 0.58  | 0.58  |      | 0.58  | 0.58  |      | 0.15  | 0.15  | 0.15  |       | 0.10  |       |      |      |      |      |
| v/c Ratio               | 0.02  | 0.57  |      | 1.73  | d     |      | 0.40  | 0.39  | 0.48  |       | 0.18  |       |      |      |      |      |
| Control Delay           | 13.4  | 14.3  |      | 53.9  |       |      | 40.7  | 40.5  | 10.7  |       | 39.1  |       |      |      |      |      |
| Queue Delay             | 0.0   | 0.0   |      | 0.0   |       |      | 0.0   | 0.0   | 0.0   |       | 0.0   |       |      |      |      |      |
| Total Delay             | 13.4  | 14.3  |      | 53.9  |       |      | 40.7  | 40.5  | 10.7  |       | 39.1  |       |      |      |      |      |
| LOS                     | B     | B     |      | D     |       |      | D     | D     | B     |       | D     |       |      |      |      |      |
| Approach Delay          |       | 14.3  |      | 53.9  |       |      |       | 26.1  |       |       | 39.1  |       |      |      |      |      |
| Approach LOS            |       | B     |      | D     |       |      |       | C     |       |       | D     |       |      |      |      |      |
| Queue Length 50th (ft)  | 1     | 160   |      | 254   |       |      | 51    | 51    | 0     |       | 16    |       |      |      |      |      |
| Queue Length 95th (ft)  | 10    | 445   |      | #692  |       |      | 128   | 126   | 63    |       | 49    |       |      |      |      |      |
| Internal Link Dist (ft) |       | 130   |      | 281   |       |      |       | 779   |       |       | 210   |       |      |      |      |      |
| Turn Bay Length (ft)    | 100   |       |      |       |       |      | 150   |       | 100   |       |       |       |      |      |      |      |
| Base Capacity (vph)     | 237   | 2102  |      | 1510  |       |      | 684   | 689   | 741   |       | 285   |       |      |      |      |      |
| Starvation Cap Reductn  | 0     | 0     |      | 0     |       |      | 0     | 0     | 0     |       | 0     |       |      |      |      |      |
| Spillback Cap Reductn   | 0     | 0     |      | 0     |       |      | 0     | 0     | 0     |       | 0     |       |      |      |      |      |
| Storage Cap Reductn     | 0     | 0     |      | 0     |       |      | 0     | 0     | 0     |       | 0     |       |      |      |      |      |
| Reduced v/c Ratio       | 0.02  | 0.55  |      | 0.72  |       |      | 0.15  | 0.15  | 0.26  |       | 0.12  |       |      |      |      |      |

| Intersection Summary              |                                                               |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|-----------------------------------|---------------------------------------------------------------|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|
| Area Type:                        | Other                                                         |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Cycle Length:                     | 130                                                           |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Actuated Cycle Length:            | 78.9                                                          |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Natural Cycle:                    | 140                                                           |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Control Type:                     | Actuated-Uncoordinated                                        |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Maximum v/c Ratio:                | 1.02                                                          |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Intersection Signal Delay:        | 32.4                                                          |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Intersection Capacity Utilization | 85.2%                                                         |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| ICU Level of Service              | E                                                             |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Analysis Period (min)             | 15                                                            |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| #                                 | 95th percentile volume exceeds capacity, queue may be longer. |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|                                   | Queue shown is maximum after two cycles.                      |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| d                                 | Defacto Left Lane. Recode with 1 though lane as a left lane.  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |

12239.00 :: Needham Street  
22: 2nd Avenue/Staples Driveway & Highland Avenue

2025 Build Conditions - with Shuttle Service  
Timing Plan: Weekday Morning



12239.00 :: Needham Street  
23: Highland Avenue & Charles Street

2025 Build Conditions - with Shuttle Service  
Timing Plan: Weekday Morning

| Intersection             |        |      |        |       |       |      |
|--------------------------|--------|------|--------|-------|-------|------|
| Int Delay, s/veh         | 0.5    |      |        |       |       |      |
| Movement                 | EBL    | EBT  | WBT    | WBR   | SBL   | SBR  |
| Lane Configurations      | ↰      | ↰↱   | ↰↱     |       | ↰     |      |
| Traffic Vol, veh/h       | 30     | 1065 | 810    | 20    | 5     | 35   |
| Future Vol, veh/h        | 30     | 1065 | 810    | 20    | 5     | 35   |
| Conflicting Peds, #/hr   | 4      | 0    | 0      | 4     | 0     | 0    |
| Sign Control             | Free   | Free | Free   | Free  | Stop  | Stop |
| RT Channelized           | -      | None | -      | None  | -     | None |
| Storage Length           | 100    | -    | -      | -     | 0     | -    |
| Veh in Median Storage, # | -      | 0    | 0      | -     | 0     | -    |
| Grade, %                 | -      | 0    | 0      | -     | 0     | -    |
| Peak Hour Factor         | 92     | 92   | 92     | 92    | 92    | 92   |
| Heavy Vehicles, %        | 1      | 1    | 2      | 2     | 0     | 0    |
| Mvmt Flow                | 33     | 1158 | 880    | 22    | 5     | 38   |
| Major/Minor              |        |      |        |       |       |      |
| Major1                   | Major2 |      | Minor2 |       |       |      |
| Conflicting Flow All     | 906    | 0    | -      | 0     | 1539  | 455  |
| Stage 1                  | -      | -    | -      | -     | 895   | -    |
| Stage 2                  | -      | -    | -      | -     | 644   | -    |
| Critical Hdwy            | 4.12   | -    | -      | -     | 6.8   | 6.9  |
| Critical Hdwy Stg 1      | -      | -    | -      | -     | 5.8   | -    |
| Critical Hdwy Stg 2      | -      | -    | -      | -     | 5.8   | -    |
| Follow-up Hdwy           | 2.21   | -    | -      | -     | 3.5   | 3.3  |
| Pot Cap-1 Maneuver       | 753    | -    | -      | -     | 108   | 558  |
| Stage 1                  | -      | -    | -      | -     | 364   | -    |
| Stage 2                  | -      | -    | -      | -     | 490   | -    |
| Platoon blocked, %       | -      | -    | -      | -     | -     | -    |
| Mov Cap-1 Maneuver       | 753    | -    | -      | -     | 103   | 556  |
| Mov Cap-2 Maneuver       | -      | -    | -      | -     | 103   | -    |
| Stage 1                  | -      | -    | -      | -     | 363   | -    |
| Stage 2                  | -      | -    | -      | -     | 467   | -    |
| Approach                 |        |      |        |       |       |      |
| EB                       | WB     |      | SB     |       |       |      |
| HCM Control Delay, s     | 0.3    | 0    | 16.4   |       |       |      |
| HCM LOS                  |        |      | C      |       |       |      |
| Minor Lane/Major Mvmt    |        |      |        |       |       |      |
| EBL                      | EBT    | WBT  | WBR    | SBLn1 |       |      |
| Capacity (veh/h)         | 753    | -    | -      | -     | 359   |      |
| HCM Lane V/C Ratio       | 0.043  | -    | -      | -     | 0.121 |      |
| HCM Control Delay (s)    | 10     | -    | -      | -     | 16.4  |      |
| HCM Lane LOS             | A      | -    | -      | -     | C     |      |
| HCM 95th %ile Q(veh)     | 0.1    | -    | -      | -     | 0.4   |      |

12239.00 :: Needham Street  
24: Highland Avenue & Wexford Street

2025 Build Conditions - with Shuttle Service  
Timing Plan: Weekday Morning

| Intersection             |        |      |        |       |       |      |
|--------------------------|--------|------|--------|-------|-------|------|
| Int Delay, s/veh         | 4.8    |      |        |       |       |      |
| Movement                 | EBL    | EBT  | WBT    | WBR   | SBL   | SBR  |
| Lane Configurations      | ↰      | ↰↱   | ↰↱     |       | ↰     |      |
| Traffic Vol, veh/h       | 115    | 1050 | 790    | 30    | 40    | 75   |
| Future Vol, veh/h        | 115    | 1050 | 790    | 30    | 40    | 75   |
| Conflicting Peds, #/hr   | 3      | 0    | 0      | 3     | 0     | 0    |
| Sign Control             | Free   | Free | Free   | Free  | Stop  | Stop |
| RT Channelized           | -      | None | -      | None  | -     | None |
| Storage Length           | 100    | -    | -      | -     | 0     | -    |
| Veh in Median Storage, # | -      | 0    | 0      | -     | 0     | -    |
| Grade, %                 | -      | 0    | 0      | -     | 0     | -    |
| Peak Hour Factor         | 92     | 92   | 92     | 92    | 92    | 92   |
| Heavy Vehicles, %        | 1      | 1    | 2      | 2     | 1     | 1    |
| Mvmt Flow                | 125    | 1141 | 859    | 33    | 43    | 82   |
| Major/Minor              |        |      |        |       |       |      |
| Major1                   | Major2 |      | Minor2 |       |       |      |
| Conflicting Flow All     | 894    | 0    | -      | 0     | 1699  | 449  |
| Stage 1                  | -      | -    | -      | -     | 878   | -    |
| Stage 2                  | -      | -    | -      | -     | 821   | -    |
| Critical Hdwy            | 4.12   | -    | -      | -     | 6.82  | 6.92 |
| Critical Hdwy Stg 1      | -      | -    | -      | -     | 5.82  | -    |
| Critical Hdwy Stg 2      | -      | -    | -      | -     | 5.82  | -    |
| Follow-up Hdwy           | 2.21   | -    | -      | -     | 3.51  | 3.31 |
| Pot Cap-1 Maneuver       | 761    | -    | -      | -     | 84    | 560  |
| Stage 1                  | -      | -    | -      | -     | 369   | -    |
| Stage 2                  | -      | -    | -      | -     | 395   | -    |
| Platoon blocked, %       | -      | -    | -      | -     | -     | -    |
| Mov Cap-1 Maneuver       | 761    | -    | -      | -     | 70    | 559  |
| Mov Cap-2 Maneuver       | -      | -    | -      | -     | 70    | -    |
| Stage 1                  | -      | -    | -      | -     | 368   | -    |
| Stage 2                  | -      | -    | -      | -     | 329   | -    |
| Approach                 |        |      |        |       |       |      |
| EB                       | WB     |      | SB     |       |       |      |
| HCM Control Delay, s     | 1.1    | 0    | 76.5   |       |       |      |
| HCM LOS                  |        |      | F      |       |       |      |
| Minor Lane/Major Mvmt    |        |      |        |       |       |      |
| EBL                      | EBT    | WBT  | WBR    | SBLn1 |       |      |
| Capacity (veh/h)         | 761    | -    | -      | -     | 163   |      |
| HCM Lane V/C Ratio       | 0.164  | -    | -      | -     | 0.767 |      |
| HCM Control Delay (s)    | 10.7   | -    | -      | -     | 76.5  |      |
| HCM Lane LOS             | B      | -    | -      | -     | F     |      |
| HCM 95th %ile Q(veh)     | 0.6    | -    | -      | -     | 4.9   |      |

2025 Build Conditions - with Shuttle Service  
Timing Plan: Weekday Morning

| Intersection Summary              |                        |
|-----------------------------------|------------------------|
| Area Type:                        | Other                  |
| Cycle Length:                     | 114                    |
| Actuated Cycle Length:            | 66.1                   |
| Natural Cycle:                    | 90                     |
| Control Type:                     | Actuated-Uncoordinated |
| Maximum v/c Ratio:                | 0.75                   |
| Intersection Signal Delay:        | 15.2                   |
| Intersection Capacity Utilization | 82.5%                  |
| Analysis Period (min)             | 15                     |
|                                   | Intersection LOS: B    |
|                                   | ICU Level of Service E |

|                                                                                                                                                                                                                                                                   |                                                                                                                                                                                                                                                                   |                                                                                                                                                                                                                                                                   |
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07/03/2018

2025 Build Conditions - with Shuttle Service  
Timing Plan: Weekday Morning

| Approach             | EB | WB | NB    | SB |
|----------------------|----|----|-------|----|
| HCM Control Delay, s | 0  | 0  | 113.8 | 12 |
| HCM LOS              |    |    | F     | B  |

Notes

-: Volume exceeds capacity    \$: Delay exceeds 300s    +: Computation Not Defined    \*: All major volume in platoon

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07/03/2018



12239.00 :: Needham Street  
27: I-95 SB Ramps & Highland Avenue

2025 Build Conditions - with Shuttle Service  
Timing Plan: Weekday Morning

| Intersection                                                                                                         |          |      |       |        |      |       |          |      |       |        |      |       |
|----------------------------------------------------------------------------------------------------------------------|----------|------|-------|--------|------|-------|----------|------|-------|--------|------|-------|
| Int Delay, s/veh                                                                                                     | 148.6    |      |       |        |      |       |          |      |       |        |      |       |
| Movement                                                                                                             | EBL      | EBT  | EBR   | WBL    | WBT  | WBR   | NBL      | NBT  | NBR   | SBL    | SBT  | SBR   |
| Lane Configurations                                                                                                  |          | ↕↕   |       |        | ↕↕   | ↕     |          |      | ↕     |        |      | ↕     |
| Traffic Vol, veh/h                                                                                                   | 0        | 1040 | 120   | 0      | 505  | 285   | 0        | 0    | 915   | 0      | 0    | 550   |
| Future Vol, veh/h                                                                                                    | 0        | 1040 | 120   | 0      | 505  | 285   | 0        | 0    | 915   | 0      | 0    | 550   |
| Conflicting Peds, #/hr                                                                                               | 0        | 0    | 1     | 1      | 0    | 0     | 0        | 0    | 1     | 0      | 0    | 0     |
| Sign Control                                                                                                         | Free     | Free | Free  | Free   | Free | Free  | Stop     | Stop | Stop  | Stop   | Stop | Stop  |
| RT Channelized                                                                                                       | -        | -    | Yield | -      | -    | Yield | -        | -    | Yield | -      | -    | Yield |
| Storage Length                                                                                                       | -        | -    | -     | -      | -    | 0     | -        | -    | 0     | -      | -    | 0     |
| Veh in Median Storage, #                                                                                             | -        | 0    | -     | -      | 0    | -     | -        | 0    | -     | -      | 0    | -     |
| Grade, %                                                                                                             | -        | 0    | -     | -      | 0    | -     | -        | 0    | -     | -      | 0    | -     |
| Peak Hour Factor                                                                                                     | 92       | 92   | 92    | 92     | 92   | 92    | 92       | 92   | 92    | 92     | 92   | 92    |
| Heavy Vehicles, %                                                                                                    | 1        | 1    | 1     | 3      | 3    | 3     | 2        | 2    | 2     | 2      | 2    | 2     |
| Mvmt Flow                                                                                                            | 0        | 1130 | 130   | 0      | 549  | 310   | 0        | 0    | 995   | 0      | 0    | 598   |
|                                                                                                                      |          |      |       |        |      |       |          |      |       |        |      |       |
| Major/Minor                                                                                                          | Major1   |      |       | Major2 |      |       | Minor1   |      |       | Minor2 |      |       |
| Conflicting Flow All                                                                                                 | -        | 0    | 0     | -      | -    | 0     | -        | -    | 567   | -      | -    | 274   |
| Stage 1                                                                                                              | -        | -    | -     | -      | -    | -     | -        | -    | -     | -      | -    | -     |
| Stage 2                                                                                                              | -        | -    | -     | -      | -    | -     | -        | -    | -     | -      | -    | -     |
| Critical Hdwy                                                                                                        | -        | -    | -     | -      | -    | -     | -        | -    | 6.94  | -      | -    | 6.94  |
| Critical Hdwy Stg 1                                                                                                  | -        | -    | -     | -      | -    | -     | -        | -    | -     | -      | -    | -     |
| Critical Hdwy Stg 2                                                                                                  | -        | -    | -     | -      | -    | -     | -        | -    | -     | -      | -    | -     |
| Follow-up Hdwy                                                                                                       | -        | -    | -     | -      | -    | -     | -        | -    | 3.32  | -      | -    | 3.32  |
| Pot Cap-1 Maneuver                                                                                                   | 0        | -    | -     | 0      | -    | -     | 0        | 0    | ~467  | 0      | 0    | 724   |
| Stage 1                                                                                                              | 0        | -    | -     | 0      | -    | -     | 0        | 0    | -     | 0      | 0    | -     |
| Stage 2                                                                                                              | 0        | -    | -     | 0      | -    | -     | 0        | 0    | -     | 0      | 0    | -     |
| Platoon blocked, %                                                                                                   | -        | -    | -     | -      | -    | -     | -        | -    | -     | -      | -    | -     |
| Mov Cap-1 Maneuver                                                                                                   | -        | -    | -     | -      | -    | -     | -        | -    | ~466  | -      | -    | 724   |
| Mov Cap-2 Maneuver                                                                                                   | -        | -    | -     | -      | -    | -     | -        | -    | -     | -      | -    | -     |
| Stage 1                                                                                                              | -        | -    | -     | -      | -    | -     | -        | -    | -     | -      | -    | -     |
| Stage 2                                                                                                              | -        | -    | -     | -      | -    | -     | -        | -    | -     | -      | -    | -     |
|                                                                                                                      |          |      |       |        |      |       |          |      |       |        |      |       |
| Approach                                                                                                             | EB       |      |       | WB     |      |       | NB       |      |       | SB     |      |       |
| HCM Control Delay, s                                                                                                 | 0        |      |       | 0      |      |       | \$ 537.3 |      |       | 28.9   |      |       |
| HCM LOS                                                                                                              |          |      |       |        |      |       | F        |      |       | D      |      |       |
|                                                                                                                      |          |      |       |        |      |       |          |      |       |        |      |       |
| Minor Lane/Major Mvmt                                                                                                | NBLn1    | EBT  | EBR   | WBT    | WBR  | SBLn1 |          |      |       |        |      |       |
| Capacity (veh/h)                                                                                                     | 466      | -    | -     | -      | -    | 724   |          |      |       |        |      |       |
| HCM Lane V/C Ratio                                                                                                   | 2.134    | -    | -     | -      | -    | 0.826 |          |      |       |        |      |       |
| HCM Control Delay (s)                                                                                                | \$ 537.3 | -    | -     | -      | -    | 28.9  |          |      |       |        |      |       |
| HCM Lane LOS                                                                                                         | F        | -    | -     | -      | -    | D     |          |      |       |        |      |       |
| HCM 95th %tile Q(veh)                                                                                                | 71.3     | -    | -     | -      | -    | 9     |          |      |       |        |      |       |
|                                                                                                                      |          |      |       |        |      |       |          |      |       |        |      |       |
| Notes                                                                                                                |          |      |       |        |      |       |          |      |       |        |      |       |
| ~: Volume exceeds capacity    \$: Delay exceeds 300s    +: Computation Not Defined    *: All major volume in platoon |          |      |       |        |      |       |          |      |       |        |      |       |

12239.00 :: Needham Street  
1: Chestnut Street & Route 9 WB Access Road

2025 Build Conditions with Shuttle Service  
Timing Plan: Weekday Evening

| Intersection               |       |       |       |       |      |      |       |      |      |       |      |      |
|----------------------------|-------|-------|-------|-------|------|------|-------|------|------|-------|------|------|
| Intersection Delay, s/veh  | 118.6 |       |       |       |      |      |       |      |      |       |      |      |
| Intersection LOS           | F     |       |       |       |      |      |       |      |      |       |      |      |
| Movement                   | EBL   | EBT   | EBR   | WBL   | WBT  | WBR  | NBL   | NBT  | NBR  | SBL   | SBT  | SBR  |
| Lane Configurations        |       | ↕     |       |       | ↕    |      |       | ↕    |      | ↕     |      |      |
| Traffic Vol, veh/h         | 120   | 1     | 30    | 125   | 30   | 30   | 65    | 515  | 1    | 1     | 450  | 230  |
| Future Vol, veh/h          | 120   | 1     | 30    | 125   | 30   | 30   | 65    | 515  | 1    | 1     | 450  | 230  |
| Peak Hour Factor           | 0.92  | 0.92  | 0.92  | 0.92  | 0.92 | 0.92 | 0.92  | 0.92 | 0.92 | 0.92  | 0.92 | 0.92 |
| Heavy Vehicles, %          | 0     | 0     | 0     | 0     | 0    | 0    | 0     | 0    | 0    | 0     | 0    | 0    |
| Mvmt Flow                  | 130   | 1     | 33    | 136   | 33   | 33   | 71    | 560  | 1    | 1     | 489  | 250  |
| Number of Lanes            | 0     | 1     | 0     | 0     | 1    | 0    | 0     | 1    | 0    | 0     | 1    | 0    |
| Approach                   | EB    |       |       | WB    |      |      | NB    |      |      | SB    |      |      |
| Opposing Approach          | WB    |       |       | EB    |      |      | SB    |      |      | NB    |      |      |
| Opposing Lanes             | 1     |       |       | 1     |      |      | 1     |      |      | 1     |      |      |
| Conflicting Approach Left  | SB    |       |       | NB    |      |      | EB    |      |      | WB    |      |      |
| Conflicting Lanes Left     | 1     |       |       | 1     |      |      | 1     |      |      | 1     |      |      |
| Conflicting Approach Right | NB    |       |       | SB    |      |      | WB    |      |      | EB    |      |      |
| Conflicting Lanes Right    | 1     |       |       | 1     |      |      | 1     |      |      | 1     |      |      |
| HCM Control Delay          | 17.5  |       |       | 18.9  |      |      | 114.6 |      |      | 171.4 |      |      |
| HCM LOS                    | C     |       |       | C     |      |      | F     |      |      | F     |      |      |
| Lane                       | NBLn1 | EBLn1 | WBLn1 | SBLn1 |      |      |       |      |      |       |      |      |
| Vol Left, %                | 11%   | 79%   | 68%   | 0%    |      |      |       |      |      |       |      |      |
| Vol Thru, %                | 89%   | 1%    | 16%   | 66%   |      |      |       |      |      |       |      |      |
| Vol Right, %               | 0%    | 20%   | 16%   | 34%   |      |      |       |      |      |       |      |      |
| Sign Control               | Stop  | Stop  | Stop  | Stop  |      |      |       |      |      |       |      |      |
| Traffic Vol by Lane        | 581   | 151   | 185   | 681   |      |      |       |      |      |       |      |      |
| LT Vol                     | 65    | 120   | 125   | 1     |      |      |       |      |      |       |      |      |
| Through Vol                | 515   | 1     | 30    | 450   |      |      |       |      |      |       |      |      |
| RT Vol                     | 1     | 30    | 30    | 230   |      |      |       |      |      |       |      |      |
| Lane Flow Rate             | 632   | 164   | 201   | 740   |      |      |       |      |      |       |      |      |
| Geometry Grp               | 1     | 1     | 1     | 1     |      |      |       |      |      |       |      |      |
| Degree of Util (X)         | 1.153 | 0.371 | 0.445 | 1.305 |      |      |       |      |      |       |      |      |
| Departure Headway (Hd)     | 7.165 | 9.209 | 8.959 | 6.73  |      |      |       |      |      |       |      |      |
| Convergence, Y/N           | Yes   | Yes   | Yes   | Yes   |      |      |       |      |      |       |      |      |
| Cap                        | 512   | 394   | 404   | 548   |      |      |       |      |      |       |      |      |
| Service Time               | 5.165 | 7.209 | 6.959 | 4.73  |      |      |       |      |      |       |      |      |
| HCM Lane V/C Ratio         | 1.234 | 0.416 | 0.498 | 1.35  |      |      |       |      |      |       |      |      |
| HCM Control Delay          | 114.6 | 17.5  | 18.9  | 171.4 |      |      |       |      |      |       |      |      |
| HCM Lane LOS               | F     | C     | C     | F     |      |      |       |      |      |       |      |      |
| HCM 95th-ile Q             | 20.3  | 1.7   | 2.2   | 29.3  |      |      |       |      |      |       |      |      |

12239.00 :: Needham Street  
2: Chestnut Street & Route 9 EB Access Road

2025 Build Conditions with Shuttle Service  
Timing Plan: Weekday Evening

| Intersection               |       |       |       |       |      |      |      |      |      |       |      |      |
|----------------------------|-------|-------|-------|-------|------|------|------|------|------|-------|------|------|
| Intersection Delay, s/veh  | 66.2  |       |       |       |      |      |      |      |      |       |      |      |
| Intersection LOS           | F     |       |       |       |      |      |      |      |      |       |      |      |
| Movement                   | EBL   | EBT   | EBR   | WBL   | WBT  | WBR  | NBL  | NBT  | NBR  | SBL   | SBT  | SBR  |
| Lane Configurations        |       |       |       |       |      |      |      |      |      |       |      |      |
| Traffic Vol, veh/h         | 180   | 155   | 15    | 1     | 2    | 20   | 2    | 380  | 35   | 100   | 505  | 2    |
| Future Vol, veh/h          | 180   | 155   | 15    | 1     | 2    | 20   | 2    | 380  | 35   | 100   | 505  | 2    |
| Peak Hour Factor           | 0.92  | 0.92  | 0.92  | 0.92  | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92  | 0.92 | 0.92 |
| Heavy Vehicles, %          | 0     | 0     | 0     | 0     | 0    | 0    | 0    | 0    | 0    | 0     | 0    | 0    |
| Mvmt Flow                  | 196   | 168   | 16    | 1     | 2    | 22   | 2    | 413  | 38   | 109   | 549  | 2    |
| Number of Lanes            | 0     | 1     | 0     | 0     | 1    | 0    | 0    | 1    | 0    | 0     | 1    | 0    |
| Approach                   | EB    |       |       | WB    |      |      | NB   |      |      | SB    |      |      |
| Opposing Approach          | WB    |       |       | EB    |      |      | SB   |      |      | NB    |      |      |
| Opposing Lanes             | 1     |       |       | 1     |      |      | 1    |      |      | 1     |      |      |
| Conflicting Approach Left  | SB    |       |       | NB    |      |      | EB   |      |      | WB    |      |      |
| Conflicting Lanes Left     | 1     |       |       | 1     |      |      | 1    |      |      | 1     |      |      |
| Conflicting Approach Right | NB    |       |       | SB    |      |      | WB   |      |      | EB    |      |      |
| Conflicting Lanes Right    | 1     |       |       | 1     |      |      | 1    |      |      | 1     |      |      |
| HCM Control Delay          | 27.8  |       |       | 12    |      |      | 32.4 |      |      | 113.6 |      |      |
| HCM LOS                    | D     |       |       | B     |      |      | D    |      |      | F     |      |      |
| Lane                       | NBLn1 | EBLn1 | WBLn1 | SBLn1 |      |      |      |      |      |       |      |      |
| Vol Left, %                | 0%    | 51%   | 4%    | 16%   |      |      |      |      |      |       |      |      |
| Vol Thru, %                | 91%   | 44%   | 9%    | 83%   |      |      |      |      |      |       |      |      |
| Vol Right, %               | 8%    | 4%    | 87%   | 0%    |      |      |      |      |      |       |      |      |
| Sign Control               | Stop  | Stop  | Stop  | Stop  |      |      |      |      |      |       |      |      |
| Traffic Vol by Lane        | 417   | 350   | 23    | 607   |      |      |      |      |      |       |      |      |
| LT Vol                     | 2     | 180   | 1     | 100   |      |      |      |      |      |       |      |      |
| Through Vol                | 380   | 155   | 2     | 505   |      |      |      |      |      |       |      |      |
| RT Vol                     | 35    | 15    | 20    | 2     |      |      |      |      |      |       |      |      |
| Lane Flow Rate             | 453   | 380   | 25    | 660   |      |      |      |      |      |       |      |      |
| Geometry Grp               | 1     | 1     | 1     | 1     |      |      |      |      |      |       |      |      |
| Degree of Util (X)         | 0.808 | 0.731 | 0.055 | 1.16  |      |      |      |      |      |       |      |      |
| Departure Headway (Hd)     | 6.771 | 7.333 | 8.467 | 6.332 |      |      |      |      |      |       |      |      |
| Convergence, Y/N           | Yes   | Yes   | Yes   | Yes   |      |      |      |      |      |       |      |      |
| Cap                        | 539   | 498   | 426   | 567   |      |      |      |      |      |       |      |      |
| Service Time               | 4.771 | 5.333 | 6.467 | 4.426 |      |      |      |      |      |       |      |      |
| HCM Lane V/C Ratio         | 0.84  | 0.763 | 0.059 | 1.164 |      |      |      |      |      |       |      |      |
| HCM Control Delay          | 32.4  | 27.8  | 12    | 113.6 |      |      |      |      |      |       |      |      |
| HCM Lane LOS               | D     | D     | B     | F     |      |      |      |      |      |       |      |      |
| HCM 95th-tile Q            | 7.8   | 6     | 0.2   | 22.2  |      |      |      |      |      |       |      |      |

12239.00 :: Needham Street  
3: Chestnut Street & Elliot Street

2025 Build Conditions with Shuttle Service  
Timing Plan: Weekday Evening

|                         |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|-------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
| Lane Group              | EBL                                                                                 | EBT                                                                                 | EBR                                                                                 | WBL                                                                                 | WBT                                                                                 | WBR                                                                                 | NBL                                                                                 | NBT                                                                                 | NBR                                                                                 | SBL                                                                                 | SBT                                                                                 | SBR                                                                                 | Ø3                                                                                  |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Lane Configurations     |  |                                                                                     |                                                                                     |  |                                                                                     |                                                                                     |  |                                                                                     |                                                                                     |  |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Traffic Volume (vph)    | 165                                                                                 | 245                                                                                 | 55                                                                                  | 10                                                                                  | 195                                                                                 | 45                                                                                  | 90                                                                                  | 280                                                                                 | 5                                                                                   | 60                                                                                  | 340                                                                                 | 315                                                                                 |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Future Volume (vph)     | 165                                                                                 | 245                                                                                 | 55                                                                                  | 10                                                                                  | 195                                                                                 | 45                                                                                  | 90                                                                                  | 280                                                                                 | 5                                                                                   | 60                                                                                  | 340                                                                                 | 315                                                                                 |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Ideal Flow (vphpl)      | 1900                                                                                | 1900                                                                                | 1900                                                                                | 1900                                                                                | 1900                                                                                | 1900                                                                                | 1900                                                                                | 1900                                                                                | 1900                                                                                | 1900                                                                                | 1900                                                                                | 1900                                                                                |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Satd. Flow (prot)       | 0                                                                                   | 1833                                                                                | 0                                                                                   | 0                                                                                   | 1843                                                                                | 0                                                                                   | 0                                                                                   | 1873                                                                                | 0                                                                                   | 0                                                                                   | 1763                                                                                | 0                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Flt Permitted           |                                                                                     | 0.661                                                                               |                                                                                     |                                                                                     | 0.978                                                                               |                                                                                     |                                                                                     | 0.662                                                                               |                                                                                     |                                                                                     | 0.932                                                                               |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Satd. Flow (perm)       | 0                                                                                   | 1231                                                                                | 0                                                                                   | 0                                                                                   | 1806                                                                                | 0                                                                                   | 0                                                                                   | 1255                                                                                | 0                                                                                   | 0                                                                                   | 1649                                                                                | 0                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Right Turn on Red       | Yes                                                                                 |                                                                                     |                                                                                     | Yes                                                                                 |                                                                                     |                                                                                     | Yes                                                                                 |                                                                                     |                                                                                     | Yes                                                                                 |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Satd. Flow (RTOR)       | 6                                                                                   |                                                                                     |                                                                                     | 10                                                                                  |                                                                                     |                                                                                     | 1                                                                                   |                                                                                     |                                                                                     | 48                                                                                  |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Link Speed (mph)        | 30                                                                                  |                                                                                     |                                                                                     | 30                                                                                  |                                                                                     |                                                                                     | 30                                                                                  |                                                                                     |                                                                                     | 30                                                                                  |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Link Distance (ft)      | 764                                                                                 |                                                                                     |                                                                                     | 972                                                                                 |                                                                                     |                                                                                     | 2055                                                                                |                                                                                     |                                                                                     | 1553                                                                                |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Travel Time (s)         | 17.4                                                                                |                                                                                     |                                                                                     | 22.1                                                                                |                                                                                     |                                                                                     | 46.7                                                                                |                                                                                     |                                                                                     | 35.3                                                                                |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Confl. Peds. (#/hr)     | 2                                                                                   |                                                                                     |                                                                                     | 2                                                                                   |                                                                                     |                                                                                     | 3                                                                                   |                                                                                     |                                                                                     | 5                                                                                   |                                                                                     |                                                                                     | 3                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Peak Hour Factor        | 0.92                                                                                | 0.92                                                                                | 0.92                                                                                | 0.92                                                                                | 0.92                                                                                | 0.92                                                                                | 0.92                                                                                | 0.92                                                                                | 0.92                                                                                | 0.92                                                                                | 0.92                                                                                | 0.92                                                                                |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Heavy Vehicles (%)      | 0%                                                                                  | 0%                                                                                  | 0%                                                                                  | 0%                                                                                  | 0%                                                                                  | 0%                                                                                  | 0%                                                                                  | 0%                                                                                  | 0%                                                                                  | 0%                                                                                  | 0%                                                                                  | 0%                                                                                  |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Shared Lane Traffic (%) |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Lane Group Flow (vph)   | 0                                                                                   | 505                                                                                 | 0                                                                                   | 0                                                                                   | 272                                                                                 | 0                                                                                   | 0                                                                                   | 407                                                                                 | 0                                                                                   | 0                                                                                   | 777                                                                                 | 0                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Turn Type               | Perm                                                                                | NA                                                                                  |                                                                                     | Perm                                                                                | NA                                                                                  |                                                                                     | Perm                                                                                | NA                                                                                  |                                                                                     | Perm                                                                                | NA                                                                                  |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Protected Phases        |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Permitted Phases        | 1                                                                                   | 1                                                                                   |                                                                                     | 1                                                                                   | 1                                                                                   |                                                                                     | 2                                                                                   | 2                                                                                   |                                                                                     | 2                                                                                   | 2                                                                                   |                                                                                     | 3                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Detector Phase          | 1                                                                                   | 1                                                                                   |                                                                                     | 1                                                                                   | 1                                                                                   |                                                                                     | 2                                                                                   | 2                                                                                   |                                                                                     | 2                                                                                   | 2                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Switch Phase            |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Minimum Initial (s)     | 6.0                                                                                 | 6.0                                                                                 |                                                                                     | 6.0                                                                                 | 6.0                                                                                 |                                                                                     | 6.0                                                                                 | 6.0                                                                                 |                                                                                     | 6.0                                                                                 | 6.0                                                                                 |                                                                                     | 4.0                                                                                 |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Minimum Split (s)       | 11.0                                                                                | 11.0                                                                                |                                                                                     | 11.0                                                                                | 11.0                                                                                |                                                                                     | 11.0                                                                                | 11.0                                                                                |                                                                                     | 11.0                                                                                | 11.0                                                                                |                                                                                     | 19.0                                                                                |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Total Split (s)         | 35.0                                                                                | 35.0                                                                                |                                                                                     | 35.0                                                                                | 35.0                                                                                |                                                                                     | 35.0                                                                                | 35.0                                                                                |                                                                                     | 35.0                                                                                | 35.0                                                                                |                                                                                     | 19.0                                                                                |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Total Split (%)         | 32.1%                                                                               | 32.1%                                                                               |                                                                                     | 32.1%                                                                               | 32.1%                                                                               |                                                                                     | 50.5%                                                                               | 50.5%                                                                               |                                                                                     | 50.5%                                                                               | 50.5%                                                                               |                                                                                     | 17%                                                                                 |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Yellow Time (s)         | 3.0                                                                                 | 3.0                                                                                 |                                                                                     | 3.0                                                                                 | 3.0                                                                                 |                                                                                     | 3.0                                                                                 | 3.0                                                                                 |                                                                                     | 3.0                                                                                 | 3.0                                                                                 |                                                                                     | 3.0                                                                                 |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| All-Red Time (s)        | 2.0                                                                                 | 2.0                                                                                 |                                                                                     | 2.0                                                                                 | 2.0                                                                                 |                                                                                     | 2.0                                                                                 | 2.0                                                                                 |                                                                                     | 2.0                                                                                 | 2.0                                                                                 |                                                                                     | 1.0                                                                                 |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Lost Time Adjust (s)    | 0.0                                                                                 |                                                                                     |                                                                                     | 0.0                                                                                 |                                                                                     |                                                                                     | 0.0                                                                                 |                                                                                     |                                                                                     | 0.0                                                                                 |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Total Lost Time (s)     | 5.0                                                                                 |                                                                                     |                                                                                     | 5.0                                                                                 |                                                                                     |                                                                                     | 5.0                                                                                 |                                                                                     |                                                                                     | 5.0                                                                                 |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Lead/Lag                | Lead                                                                                | Lead                                                                                |                                                                                     | Lead                                                                                | Lead                                                                                |                                                                                     | Lag                                                                                 | Lag                                                                                 |                                                                                     | Lag                                                                                 | Lag                                                                                 |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Lead-Lag Optimize?      |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Recall Mode             | None                                                                                | None                                                                                |                                                                                     | None                                                                                | None                                                                                |                                                                                     | None                                                                                | None                                                                                |                                                                                     | None                                                                                | None                                                                                |                                                                                     | None                                                                                |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Act Effct Green (s)     | 30.2                                                                                |                                                                                     |                                                                                     | 30.2                                                                                |                                                                                     |                                                                                     | 49.5                                                                                |                                                                                     |                                                                                     | 49.5                                                                                |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Actuated g/C Ratio      | 0.32                                                                                |                                                                                     |                                                                                     | 0.32                                                                                |                                                                                     |                                                                                     | 0.53                                                                                |                                                                                     |                                                                                     | 0.53                                                                                |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| v/c Ratio               | 1.25                                                                                |                                                                                     |                                                                                     | 0.46                                                                                |                                                                                     |                                                                                     | 0.61                                                                                |                                                                                     |                                                                                     | 0.86                                                                                |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Control Delay           | 162.0                                                                               |                                                                                     |                                                                                     | 28.5                                                                                |                                                                                     |                                                                                     | 21.4                                                                                |                                                                                     |                                                                                     | 30.7                                                                                |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Queue Delay             | 0.0                                                                                 |                                                                                     |                                                                                     | 0.0                                                                                 |                                                                                     |                                                                                     | 0.0                                                                                 |                                                                                     |                                                                                     | 0.0                                                                                 |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Total Delay             | 162.0                                                                               |                                                                                     |                                                                                     | 28.5                                                                                |                                                                                     |                                                                                     | 21.4                                                                                |                                                                                     |                                                                                     | 30.7                                                                                |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| LOS                     | F                                                                                   |                                                                                     |                                                                                     | C                                                                                   |                                                                                     |                                                                                     | C                                                                                   |                                                                                     |                                                                                     | C                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Approach Delay          | 162.0                                                                               |                                                                                     |                                                                                     | 28.5                                                                                |                                                                                     |                                                                                     | 21.4                                                                                |                                                                                     |                                                                                     | 30.7                                                                                |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Approach LOS            | F                                                                                   |                                                                                     |                                                                                     | C                                                                                   |                                                                                     |                                                                                     | C                                                                                   |                                                                                     |                                                                                     | C                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Queue Length 50th (ft)  | ~356                                                                                |                                                                                     |                                                                                     | 115                                                                                 |                                                                                     |                                                                                     | 142                                                                                 |                                                                                     |                                                                                     | 322                                                                                 |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Queue Length 95th (ft)  | #696                                                                                |                                                                                     |                                                                                     | 241                                                                                 |                                                                                     |                                                                                     | 346                                                                                 |                                                                                     |                                                                                     | #781                                                                                |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Internal Link Dist (ft) | 684                                                                                 |                                                                                     |                                                                                     | 892                                                                                 |                                                                                     |                                                                                     | 1975                                                                                |                                                                                     |                                                                                     | 1473                                                                                |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Turn Bay Length (ft)    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Base Capacity (vph)     | 404                                                                                 |                                                                                     |                                                                                     | 593                                                                                 |                                                                                     |                                                                                     | 679                                                                                 |                                                                                     |                                                                                     | 914                                                                                 |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Starvation Cap Reductn  | 0                                                                                   |                                                                                     |                                                                                     | 0                                                                                   |                                                                                     |                                                                                     | 0                                                                                   |                                                                                     |                                                                                     | 0                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Spillback Cap Reductn   | 0                                                                                   |                                                                                     |                                                                                     | 0                                                                                   |                                                                                     |                                                                                     | 0                                                                                   |                                                                                     |                                                                                     | 0                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Storage Cap Reductn     | 0                                                                                   |                                                                                     |                                                                                     | 0                                                                                   |                                                                                     |                                                                                     | 0                                                                                   |                                                                                     |                                                                                     | 0                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Reduced v/c Ratio       | 1.25                                                                                |                                                                                     |                                                                                     | 0.46                                                                                |                                                                                     |                                                                                     | 0.60                                                                                |                                                                                     |                                                                                     | 0.85                                                                                |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |

| Intersection Summary                                            |                        |
|-----------------------------------------------------------------|------------------------|
| Area Type:                                                      | Other                  |
| Cycle Length:                                                   | 109                    |
| Actuated Cycle Length:                                          | 93                     |
| Natural Cycle:                                                  | 150                    |
| Control Type:                                                   | Actuated-Uncoordinated |
| Maximum v/c Ratio:                                              | 1.25                   |
| Intersection Signal Delay:                                      | 62.3                   |
| Intersection Capacity Utilization:                              | 95.6%                  |
| Analysis Period (min):                                          | 15                     |
| ~ Volume exceeds capacity, queue is theoretically infinite.     |                        |
| Queue shown is maximum after two cycles.                        |                        |
| # 95th percentile volume exceeds capacity, queue may be longer. |                        |
| Queue shown is maximum after two cycles.                        |                        |

12239.00 :: Needham Street  
4: Oak Street & Chestnut Street

2025 Build Conditions with Shuttle Service  
Timing Plan: Weekday Evening

|                         |  |  |  |  |  |  |  |  |  |  |  |  |  |
|-------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|
| Lane Group              | EBL                                                                               | EBT                                                                               | EBR                                                                               | WBL                                                                               | WBT                                                                               | WBR                                                                               | NBL                                                                               | NBT                                                                               | NBR                                                                               | SBL                                                                               | SBT                                                                               | SBR                                                                               | Ø3                                                                                |
| Lane Configurations     |  |                                                                                   |                                                                                   |  |                                                                                   |                                                                                   |  |                                                                                   |                                                                                   |  |                                                                                   |                                                                                   |                                                                                   |
| Traffic Volume (vph)    | 20                                                                                | 15                                                                                | 295                                                                               | 35                                                                                | 25                                                                                | 5                                                                                 | 340                                                                               | 110                                                                               | 15                                                                                | 5                                                                                 | 135                                                                               | 20                                                                                |                                                                                   |
| Future Volume (vph)     | 20                                                                                | 15                                                                                | 295                                                                               | 35                                                                                | 25                                                                                | 5                                                                                 | 340                                                                               | 110                                                                               | 15                                                                                | 5                                                                                 | 135                                                                               | 20                                                                                |                                                                                   |
| Ideal Flow (vphpl)      | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                              |                                                                                   |
| Satd. Flow (prot)       | 0                                                                                 | 1628                                                                              | 0                                                                                 | 0                                                                                 | 1829                                                                              | 0                                                                                 | 0                                                                                 | 1807                                                                              | 0                                                                                 | 0                                                                                 | 1841                                                                              | 0                                                                                 |                                                                                   |
| Flt Permitted           |                                                                                   | 0.976                                                                             |                                                                                   |                                                                                   | 0.414                                                                             |                                                                                   |                                                                                   | 0.677                                                                             |                                                                                   |                                                                                   | 0.987                                                                             |                                                                                   |                                                                                   |
| Satd. Flow (perm)       | 0                                                                                 | 1594                                                                              | 0                                                                                 | 0                                                                                 | 776                                                                               | 0                                                                                 | 0                                                                                 | 1263                                                                              | 0                                                                                 | 0                                                                                 | 1819                                                                              | 0                                                                                 |                                                                                   |
| Right Turn on Red       | Yes                                                                               |                                                                                   |                                                                                   | Yes                                                                               |                                                                                   |                                                                                   | Yes                                                                               |                                                                                   |                                                                                   | Yes                                                                               |                                                                                   |                                                                                   |                                                                                   |
| Satd. Flow (RTOR)       | 321                                                                               |                                                                                   |                                                                                   | 4                                                                                 |                                                                                   |                                                                                   | 2                                                                                 |                                                                                   |                                                                                   | 8                                                                                 |                                                                                   |                                                                                   |                                                                                   |
| Link Speed (mph)        | 30                                                                                |                                                                                   |                                                                                   | 30                                                                                |                                                                                   |                                                                                   | 30                                                                                |                                                                                   |                                                                                   | 30                                                                                |                                                                                   |                                                                                   |                                                                                   |
| Link Distance (ft)      | 2055                                                                              |                                                                                   |                                                                                   | 492                                                                               |                                                                                   |                                                                                   | 226                                                                               |                                                                                   |                                                                                   | 762                                                                               |                                                                                   |                                                                                   |                                                                                   |
| Travel Time (s)         | 46.7                                                                              |                                                                                   |                                                                                   | 11.2                                                                              |                                                                                   |                                                                                   | 5.1                                                                               |                                                                                   |                                                                                   | 17.3                                                                              |                                                                                   |                                                                                   |                                                                                   |
| Confl. Peds. (#/hr)     | 2                                                                                 |                                                                                   | 3                                                                                 | 3                                                                                 |                                                                                   | 2                                                                                 | 4                                                                                 |                                                                                   | 4                                                                                 | 4                                                                                 |                                                                                   | 4                                                                                 |                                                                                   |
| Peak Hour Factor        | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              |                                                                                   |
| Heavy Vehicles (%)      | 0%                                                                                | 0%                                                                                | 0%                                                                                | 0%                                                                                | 0%                                                                                | 0%                                                                                | 1%                                                                                | 1%                                                                                | 1%                                                                                | 1%                                                                                | 1%                                                                                | 1%                                                                                |                                                                                   |
| Shared Lane Traffic (%) |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| Lane Group Flow (vph)   | 0                                                                                 | 359                                                                               | 0                                                                                 | 0                                                                                 | 70                                                                                | 0                                                                                 | 0                                                                                 | 506                                                                               | 0                                                                                 | 0                                                                                 | 174                                                                               | 0                                                                                 |                                                                                   |
| Turn Type               | Perm                                                                              | NA                                                                                |                                                                                   | Perm                                                                              | NA                                                                                |                                                                                   | Perm                                                                              | NA                                                                                |                                                                                   | Perm                                                                              | NA                                                                                |                                                                                   |                                                                                   |
| Protected Phases        | 1                                                                                 |                                                                                   |                                                                                   | 1                                                                                 |                                                                                   |                                                                                   | 2                                                                                 |                                                                                   |                                                                                   | 2                                                                                 |                                                                                   |                                                                                   | 3                                                                                 |
| Permitted Phases        | 1                                                                                 |                                                                                   |                                                                                   | 1                                                                                 |                                                                                   |                                                                                   | 2                                                                                 |                                                                                   |                                                                                   | 2                                                                                 |                                                                                   |                                                                                   |                                                                                   |
| Detector Phase          | 1                                                                                 |                                                                                   | 1                                                                                 | 1                                                                                 |                                                                                   | 1                                                                                 | 2                                                                                 |                                                                                   | 2                                                                                 | 2                                                                                 |                                                                                   | 2                                                                                 |                                                                                   |
| Switch Phase            |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| Minimum Initial (s)     | 8.0                                                                               | 8.0                                                                               |                                                                                   | 8.0                                                                               | 8.0                                                                               |                                                                                   | 8.0                                                                               | 8.0                                                                               |                                                                                   | 8.0                                                                               | 8.0                                                                               |                                                                                   | 8.0                                                                               |
| Minimum Split (s)       | 13.0                                                                              | 13.0                                                                              |                                                                                   | 13.0                                                                              | 13.0                                                                              |                                                                                   | 14.0                                                                              | 14.0                                                                              |                                                                                   | 14.0                                                                              | 14.0                                                                              |                                                                                   | 18.0                                                                              |
| Total Split (s)         | 35.0                                                                              | 35.0                                                                              |                                                                                   | 35.0                                                                              | 35.0                                                                              |                                                                                   | 36.0                                                                              | 36.0                                                                              |                                                                                   | 36.0                                                                              | 36.0                                                                              |                                                                                   | 25.0                                                                              |
| Total Split (%)         | 36.5%                                                                             | 36.5%                                                                             |                                                                                   | 36.5%                                                                             | 36.5%                                                                             |                                                                                   | 37.5%                                                                             | 37.5%                                                                             |                                                                                   | 37.5%                                                                             | 37.5%                                                                             |                                                                                   | 26%                                                                               |
| Yellow Time (s)         | 4.0                                                                               | 4.0                                                                               |                                                                                   | 4.0                                                                               | 4.0                                                                               |                                                                                   | 4.0                                                                               | 4.0                                                                               |                                                                                   | 4.0                                                                               | 4.0                                                                               |                                                                                   | 4.0                                                                               |
| All-Red Time (s)        | 1.0                                                                               | 1.0                                                                               |                                                                                   | 1.0                                                                               | 1.0                                                                               |                                                                                   | 2.0                                                                               | 2.0                                                                               |                                                                                   | 2.0                                                                               | 2.0                                                                               |                                                                                   | 1.0                                                                               |
| Lost Time Adjust (s)    | 0.0                                                                               |                                                                                   |                                                                                   | 0.0                                                                               |                                                                                   |                                                                                   | 0.0                                                                               |                                                                                   |                                                                                   | 0.0                                                                               |                                                                                   |                                                                                   |                                                                                   |
| Total Lost Time (s)     | 5.0                                                                               |                                                                                   |                                                                                   | 5.0                                                                               |                                                                                   |                                                                                   | 6.0                                                                               |                                                                                   |                                                                                   | 6.0                                                                               |                                                                                   |                                                                                   |                                                                                   |
| Lead/Lag                | Lead                                                                              | Lead                                                                              |                                                                                   | Lead                                                                              | Lead                                                                              |                                                                                   | Lag                                                                               | Lag                                                                               |                                                                                   | Lag                                                                               | Lag                                                                               |                                                                                   |                                                                                   |
| Lead-Lag Optimize?      |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| Recall Mode             | Min                                                                               | Min                                                                               |                                                                                   | Min                                                                               | Min                                                                               |                                                                                   | Min                                                                               | Min                                                                               |                                                                                   | Min                                                                               | Min                                                                               |                                                                                   | None                                                                              |
| Act Effct Green (s)     | 11.0                                                                              |                                                                                   |                                                                                   | 11.0                                                                              |                                                                                   |                                                                                   | 31.0                                                                              |                                                                                   |                                                                                   | 31.0                                                                              |                                                                                   |                                                                                   |                                                                                   |
| Actuated g/C Ratio      | 0.20                                                                              |                                                                                   |                                                                                   | 0.20                                                                              |                                                                                   |                                                                                   | 0.55                                                                              |                                                                                   |                                                                                   | 0.55                                                                              |                                                                                   |                                                                                   |                                                                                   |
| v/c Ratio               | 0.63                                                                              |                                                                                   |                                                                                   | 0.45                                                                              |                                                                                   |                                                                                   | 0.72                                                                              |                                                                                   |                                                                                   | 0.17                                                                              |                                                                                   |                                                                                   |                                                                                   |
| Control Delay           | 9.8                                                                               |                                                                                   |                                                                                   | 30.0                                                                              |                                                                                   |                                                                                   | 21.4                                                                              |                                                                                   |                                                                                   | 9.3                                                                               |                                                                                   |                                                                                   |                                                                                   |
| Queue Delay             | 0.0                                                                               |                                                                                   |                                                                                   | 0.0                                                                               |                                                                                   |                                                                                   | 0.0                                                                               |                                                                                   |                                                                                   | 0.0                                                                               |                                                                                   |                                                                                   |                                                                                   |
| Total Delay             | 9.8                                                                               |                                                                                   |                                                                                   | 30.0                                                                              |                                                                                   |                                                                                   | 21.4                                                                              |                                                                                   |                                                                                   | 9.3                                                                               |                                                                                   |                                                                                   |                                                                                   |
| LOS                     | A                                                                                 |                                                                                   |                                                                                   | C                                                                                 |                                                                                   |                                                                                   | C                                                                                 |                                                                                   |                                                                                   | A                                                                                 |                                                                                   |                                                                                   |                                                                                   |
| Approach Delay          | 9.8                                                                               |                                                                                   |                                                                                   | 30.0                                                                              |                                                                                   |                                                                                   | 21.4                                                                              |                                                                                   |                                                                                   | 9.3                                                                               |                                                                                   |                                                                                   |                                                                                   |
| Approach LOS            | A                                                                                 |                                                                                   |                                                                                   | C                                                                                 |                                                                                   |                                                                                   | C                                                                                 |                                                                                   |                                                                                   | A                                                                                 |                                                                                   |                                                                                   |                                                                                   |
| Queue Length 50th (ft)  | 10                                                                                |                                                                                   |                                                                                   | 18                                                                                |                                                                                   |                                                                                   | 86                                                                                |                                                                                   |                                                                                   | 19                                                                                |                                                                                   |                                                                                   |                                                                                   |
| Queue Length 95th (ft)  | 85                                                                                |                                                                                   |                                                                                   | 65                                                                                |                                                                                   |                                                                                   | #462                                                                              |                                                                                   |                                                                                   | 99                                                                                |                                                                                   |                                                                                   |                                                                                   |
| Internal Link Dist (ft) | 1975                                                                              |                                                                                   |                                                                                   | 412                                                                               |                                                                                   |                                                                                   | 146                                                                               |                                                                                   |                                                                                   | 682                                                                               |                                                                                   |                                                                                   |                                                                                   |
| Turn Bay Length (ft)    |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| Base Capacity (vph)     | 1027                                                                              |                                                                                   |                                                                                   | 431                                                                               |                                                                                   |                                                                                   | 701                                                                               |                                                                                   |                                                                                   | 1011                                                                              |                                                                                   |                                                                                   |                                                                                   |
| Starvation Cap Reductn  | 0                                                                                 |                                                                                   |                                                                                   | 0                                                                                 |                                                                                   |                                                                                   | 0                                                                                 |                                                                                   |                                                                                   | 0                                                                                 |                                                                                   |                                                                                   |                                                                                   |
| Spillback Cap Reductn   | 0                                                                                 |                                                                                   |                                                                                   | 0                                                                                 |                                                                                   |                                                                                   | 0                                                                                 |                                                                                   |                                                                                   | 0                                                                                 |                                                                                   |                                                                                   |                                                                                   |
| Storage Cap Reductn     | 0                                                                                 |                                                                                   |                                                                                   | 0                                                                                 |                                                                                   |                                                                                   | 0                                                                                 |                                                                                   |                                                                                   | 0                                                                                 |                                                                                   |                                                                                   |                                                                                   |
| Reduced v/c Ratio       | 0.35                                                                              |                                                                                   |                                                                                   | 0.16                                                                              |                                                                                   |                                                                                   | 0.72                                                                              |                                                                                   |                                                                                   | 0.17                                                                              |                                                                                   |                                                                                   |                                                                                   |

Intersection Summary

Area Type: Other

Cycle Length: 96

Actuated Cycle Length: 55.9

Natural Cycle: 70

Control Type: Actuated-Uncoordinated

Maximum v/c Ratio: 0.72

Intersection Signal Delay: 16.3

Intersection LOS: B

Intersection Capacity Utilization 68.7%

ICU Level of Service C

Analysis Period (min) 15

# 95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

Splits and Phases: 4: Oak Street & Chestnut Street



Lanes, Volumes, Timings  
VHB/MSD

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07/03/2018

12239.00 :: Needham Street  
5: Oak Street & Site Driveway

2025 Build Conditions with Shuttle Service  
Timing Plan: Weekday Evening

| Intersection             | WBL  | WBR  | NBT  | NBR  | SBL  | SBT  |
|--------------------------|------|------|------|------|------|------|
| Int Delay, s/veh         | 3.1  |      |      |      |      |      |
| Movement                 | WBL  | WBR  | NBT  | NBR  | SBL  | SBT  |
| Lane Configurations      | ↔    |      | ↔    |      | ↔    | ↔    |
| Traffic Vol, veh/h       | 65   | 60   | 405  | 55   | 50   | 415  |
| Future Vol, veh/h        | 65   | 60   | 405  | 55   | 50   | 415  |
| Conflicting Peds, #/hr   | 0    | 0    | 0    | 6    | 6    | 0    |
| Sign Control             | Stop | Stop | Free | Free | Free | Free |
| RT Channelized           | -    | None | -    | None | -    | None |
| Storage Length           | 0    | -    | -    | -    | -    | -    |
| Veh in Median Storage, # | 0    | -    | 0    | -    | -    | 0    |
| Grade, %                 | 0    | -    | 0    | -    | -    | 0    |
| Peak Hour Factor         | 92   | 92   | 92   | 92   | 92   | 92   |
| Heavy Vehicles, %        | 0    | 0    | 1    | 1    | 1    | 1    |
| Mvmt Flow                | 71   | 65   | 440  | 60   | 54   | 451  |

| Major/Minor          | Minor1 | Major1 | Major2 |
|----------------------|--------|--------|--------|
| Conflicting Flow All | 1036   | 476    | 0      |
| Stage 1              | 476    | -      | -      |
| Stage 2              | 560    | -      | -      |
| Critical Hdwy        | 6.4    | 6.2    | 4.11   |
| Critical Hdwy Stg 1  | 5.4    | -      | -      |
| Critical Hdwy Stg 2  | 5.4    | -      | -      |
| Follow-up Hdwy       | 3.5    | 3.3    | 2.209  |
| Pot Cap-1 Maneuver   | 259    | 593    | 1064   |
| Stage 1              | 629    | -      | -      |
| Stage 2              | 576    | -      | -      |
| Platoon blocked, %   | -      | -      | -      |
| Mov Cap-1 Maneuver   | 240    | 590    | 1064   |
| Mov Cap-2 Maneuver   | 240    | -      | -      |
| Stage 1              | 626    | -      | -      |
| Stage 2              | 537    | -      | -      |

| Approach             | WB   | NB | SB  |
|----------------------|------|----|-----|
| HCM Control Delay, s | 22.8 | 0  | 0.9 |
| HCM LOS              | C    |    |     |

| Minor Lane/Major Mvmt | NBT | NBR | WBLn1 | SBL   | SBT |
|-----------------------|-----|-----|-------|-------|-----|
| Capacity (veh/h)      | -   | -   | 336   | 1064  | -   |
| HCM Lane V/C Ratio    | -   | -   | 0.404 | 0.051 | -   |
| HCM Control Delay (s) | -   | -   | 22.8  | 8.6   | 0   |
| HCM Lane LOS          | -   | -   | C     | A     | A   |
| HCM 95th %ile Q(veh)  | -   | -   | 1.9   | 0.2   | -   |

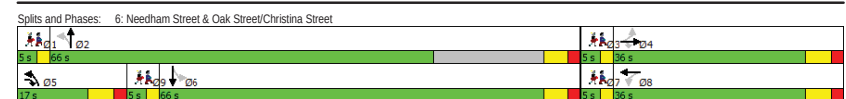
HCM 2010 TWSC  
VHB/MSD

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07/03/2018

2025 Build Conditions with Shuttle Service  
Timing Plan: Weekday Evening

| Intersection Summary                                                                                    |                                                               |
|---------------------------------------------------------------------------------------------------------|---------------------------------------------------------------|
| Area Type:                                                                                              | Other                                                         |
| Cycle Length:                                                                                           | 129                                                           |
| Actuated Cycle Length:                                                                                  | 120                                                           |
| Natural Cycle:                                                                                          | 150                                                           |
| Control Type:                                                                                           | Actuated-Uncoordinated                                        |
| Maximum v/c Ratio:                                                                                      | 1.19                                                          |
| Intersection Signal Delay:                                                                              | 66.8                                                          |
| Intersection Capacity Utilization                                                                       | 107.3%                                                        |
| Analysis Period (min)                                                                                   | 15                                                            |
| ~ Volume exceeds capacity, queue is theoretically infinite.<br>Queue shown is maximum after two cycles. |                                                               |
| #                                                                                                       | 95th percentile volume exceeds capacity, queue may be longer. |
| Queue shown is maximum after two cycles.                                                                |                                                               |

2025 Build Conditions with Shuttle Service  
Timing Plan: Weekday Evening



12239.00 :: Needham Street  
7: Needham Street & South Site Driveway

2025 Build Conditions with Shuttle Service  
Timing Plan: Weekday Evening

| Intersection             |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
|--------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|
| Int Delay, s/veh         | 3.5                                                                               |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| Movement                 | EBL                                                                               | EBR                                                                               | NBL                                                                               | NBT                                                                               | SBT                                                                               | SBR                                                                               |
| Lane Configurations      |  |  |  |  |  |  |
| Traffic Vol, veh/h       | 10                                                                                | 135                                                                               | 40                                                                                | 970                                                                               | 855                                                                               | 45                                                                                |
| Future Vol, veh/h        | 10                                                                                | 135                                                                               | 40                                                                                | 970                                                                               | 855                                                                               | 45                                                                                |
| Conflicting Peds, #/hr   | 0                                                                                 | 0                                                                                 | 7                                                                                 | 0                                                                                 | 0                                                                                 | 7                                                                                 |
| Sign Control             | Stop                                                                              | Stop                                                                              | Free                                                                              | Free                                                                              | Free                                                                              | Free                                                                              |
| RT Channelized           | -                                                                                 | None                                                                              | -                                                                                 | None                                                                              | -                                                                                 | None                                                                              |
| Storage Length           | 0                                                                                 | -                                                                                 | 50                                                                                | -                                                                                 | -                                                                                 | -                                                                                 |
| Veh in Median Storage, # | 0                                                                                 | -                                                                                 | -                                                                                 | 0                                                                                 | 0                                                                                 | -                                                                                 |
| Grade, %                 | 0                                                                                 | -                                                                                 | -                                                                                 | 0                                                                                 | 0                                                                                 | -                                                                                 |
| Peak Hour Factor         | 92                                                                                | 92                                                                                | 92                                                                                | 92                                                                                | 92                                                                                | 92                                                                                |
| Heavy Vehicles, %        | 0                                                                                 | 0                                                                                 | 1                                                                                 | 1                                                                                 | 1                                                                                 | 1                                                                                 |
| Mvmt Flow                | 11                                                                                | 147                                                                               | 43                                                                                | 1054                                                                              | 929                                                                               | 49                                                                                |
| Major/Minor              |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| Minor2                   | Major1                                                                            |                                                                                   | Major2                                                                            |                                                                                   |                                                                                   |                                                                                   |
| Conflicting Flow All     | 2102                                                                              | 961                                                                               | 985                                                                               | 0                                                                                 | -                                                                                 | 0                                                                                 |
| Stage 1                  | 961                                                                               | -                                                                                 | -                                                                                 | -                                                                                 | -                                                                                 | -                                                                                 |
| Stage 2                  | 1141                                                                              | -                                                                                 | -                                                                                 | -                                                                                 | -                                                                                 | -                                                                                 |
| Critical Hdwy            | 6.4                                                                               | 6.2                                                                               | 4.11                                                                              | -                                                                                 | -                                                                                 | -                                                                                 |
| Critical Hdwy Stg 1      | 5.4                                                                               | -                                                                                 | -                                                                                 | -                                                                                 | -                                                                                 | -                                                                                 |
| Critical Hdwy Stg 2      | 5.4                                                                               | -                                                                                 | -                                                                                 | -                                                                                 | -                                                                                 | -                                                                                 |
| Follow-up Hdwy           | 3.5                                                                               | 3.3                                                                               | 2.209                                                                             | -                                                                                 | -                                                                                 | -                                                                                 |
| Pot Cap-1 Maneuver       | 58                                                                                | 314                                                                               | 705                                                                               | -                                                                                 | -                                                                                 | -                                                                                 |
| Stage 1                  | 374                                                                               | -                                                                                 | -                                                                                 | -                                                                                 | -                                                                                 | -                                                                                 |
| Stage 2                  | 307                                                                               | -                                                                                 | -                                                                                 | -                                                                                 | -                                                                                 | -                                                                                 |
| Platoon blocked, %       | -                                                                                 | -                                                                                 | -                                                                                 | -                                                                                 | -                                                                                 | -                                                                                 |
| Mov Cap-1 Maneuver       | 54                                                                                | 312                                                                               | 705                                                                               | -                                                                                 | -                                                                                 | -                                                                                 |
| Mov Cap-2 Maneuver       | 54                                                                                | -                                                                                 | -                                                                                 | -                                                                                 | -                                                                                 | -                                                                                 |
| Stage 1                  | 372                                                                               | -                                                                                 | -                                                                                 | -                                                                                 | -                                                                                 | -                                                                                 |
| Stage 2                  | 287                                                                               | -                                                                                 | -                                                                                 | -                                                                                 | -                                                                                 | -                                                                                 |
| Approach                 |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| EB                       | NB                                                                                |                                                                                   | SB                                                                                |                                                                                   |                                                                                   |                                                                                   |
| HCM Control Delay, s     | 46.8                                                                              | 0.4                                                                               | -                                                                                 | 0                                                                                 | -                                                                                 | -                                                                                 |
| HCM LOS                  | E                                                                                 | -                                                                                 | -                                                                                 | -                                                                                 | -                                                                                 | -                                                                                 |
| Minor Lane/Major Mvmt    |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| NBL                      | NBT                                                                               | EBLn1                                                                             | SBT                                                                               | SBR                                                                               | -                                                                                 | -                                                                                 |
| Capacity (veh/h)         | 705                                                                               | -                                                                                 | 235                                                                               | -                                                                                 | -                                                                                 | -                                                                                 |
| HCM Lane V/C Ratio       | 0.062                                                                             | -                                                                                 | 0.671                                                                             | -                                                                                 | -                                                                                 | -                                                                                 |
| HCM Control Delay (s)    | 10.4                                                                              | -                                                                                 | 46.8                                                                              | -                                                                                 | -                                                                                 | -                                                                                 |
| HCM Lane LOS             | B                                                                                 | -                                                                                 | E                                                                                 | -                                                                                 | -                                                                                 | -                                                                                 |
| HCM 95th %tile Q(veh)    | 0.2                                                                               | -                                                                                 | 4.2                                                                               | -                                                                                 | -                                                                                 | -                                                                                 |

12239.00 :: Needham Street  
8: Needham Street & TJMaxx Driveway

2025 Build Conditions with Shuttle Service  
Timing Plan: Weekday Evening

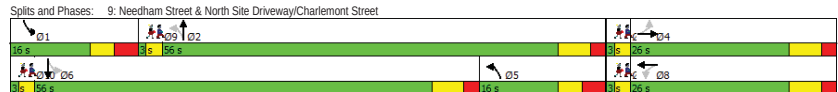
| Intersection             |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
|--------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
| Int Delay, s/veh         | 0.1                                                                                 |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Movement                 | WBL                                                                                 | WBR                                                                                 | NBT                                                                                 | NBR                                                                                 | SBL                                                                                 | SBT                                                                                 |
| Lane Configurations      |  |  |  |  |  |  |
| Traffic Vol, veh/h       | 2                                                                                   | 1                                                                                   | 895                                                                                 | 20                                                                                  | 10                                                                                  | 860                                                                                 |
| Future Vol, veh/h        | 2                                                                                   | 1                                                                                   | 895                                                                                 | 20                                                                                  | 10                                                                                  | 860                                                                                 |
| Conflicting Peds, #/hr   | 0                                                                                   | 0                                                                                   | 0                                                                                   | 4                                                                                   | 4                                                                                   | 0                                                                                   |
| Sign Control             | Stop                                                                                | Stop                                                                                | Free                                                                                | Free                                                                                | Free                                                                                | Free                                                                                |
| RT Channelized           | -                                                                                   | None                                                                                | -                                                                                   | None                                                                                | -                                                                                   | None                                                                                |
| Storage Length           | -                                                                                   | 0                                                                                   | -                                                                                   | -                                                                                   | 80                                                                                  | -                                                                                   |
| Veh in Median Storage, # | 0                                                                                   | -                                                                                   | 0                                                                                   | -                                                                                   | -                                                                                   | 0                                                                                   |
| Grade, %                 | 0                                                                                   | -                                                                                   | 0                                                                                   | -                                                                                   | -                                                                                   | 0                                                                                   |
| Peak Hour Factor         | 92                                                                                  | 92                                                                                  | 92                                                                                  | 92                                                                                  | 92                                                                                  | 92                                                                                  |
| Heavy Vehicles, %        | 0                                                                                   | 0                                                                                   | 1                                                                                   | 1                                                                                   | 1                                                                                   | 1                                                                                   |
| Mvmt Flow                | 2                                                                                   | 1                                                                                   | 973                                                                                 | 22                                                                                  | 11                                                                                  | 935                                                                                 |
| Major/Minor              |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Minor1                   | Major1                                                                              |                                                                                     | Major2                                                                              |                                                                                     |                                                                                     |                                                                                     |
| Conflicting Flow All     | 1945                                                                                | 988                                                                                 | 0                                                                                   | 0                                                                                   | 999                                                                                 | 0                                                                                   |
| Stage 1                  | 988                                                                                 | -                                                                                   | -                                                                                   | -                                                                                   | -                                                                                   | -                                                                                   |
| Stage 2                  | 957                                                                                 | -                                                                                   | -                                                                                   | -                                                                                   | -                                                                                   | -                                                                                   |
| Critical Hdwy            | 6.4                                                                                 | 6.2                                                                                 | -                                                                                   | -                                                                                   | 4.11                                                                                | -                                                                                   |
| Critical Hdwy Stg 1      | 5.4                                                                                 | -                                                                                   | -                                                                                   | -                                                                                   | -                                                                                   | -                                                                                   |
| Critical Hdwy Stg 2      | 5.4                                                                                 | -                                                                                   | -                                                                                   | -                                                                                   | -                                                                                   | -                                                                                   |
| Follow-up Hdwy           | 3.5                                                                                 | 3.3                                                                                 | -                                                                                   | -                                                                                   | 2.209                                                                               | -                                                                                   |
| Pot Cap-1 Maneuver       | 72                                                                                  | 303                                                                                 | -                                                                                   | -                                                                                   | 697                                                                                 | -                                                                                   |
| Stage 1                  | 364                                                                                 | -                                                                                   | -                                                                                   | -                                                                                   | -                                                                                   | -                                                                                   |
| Stage 2                  | 376                                                                                 | -                                                                                   | -                                                                                   | -                                                                                   | -                                                                                   | -                                                                                   |
| Platoon blocked, %       | -                                                                                   | -                                                                                   | -                                                                                   | -                                                                                   | -                                                                                   | -                                                                                   |
| Mov Cap-1 Maneuver       | 71                                                                                  | 302                                                                                 | -                                                                                   | -                                                                                   | 697                                                                                 | -                                                                                   |
| Mov Cap-2 Maneuver       | 71                                                                                  | -                                                                                   | -                                                                                   | -                                                                                   | -                                                                                   | -                                                                                   |
| Stage 1                  | 363                                                                                 | -                                                                                   | -                                                                                   | -                                                                                   | -                                                                                   | -                                                                                   |
| Stage 2                  | 370                                                                                 | -                                                                                   | -                                                                                   | -                                                                                   | -                                                                                   | -                                                                                   |
| Approach                 |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| WB                       | NB                                                                                  |                                                                                     | SB                                                                                  |                                                                                     |                                                                                     |                                                                                     |
| HCM Control Delay, s     | 17                                                                                  | 0                                                                                   | -                                                                                   | 0.1                                                                                 | -                                                                                   | -                                                                                   |
| HCM LOS                  | C                                                                                   | -                                                                                   | -                                                                                   | -                                                                                   | -                                                                                   | -                                                                                   |
| Minor Lane/Major Mvmt    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| NBT                      | NBR                                                                                 | WBLn1                                                                               | SBL                                                                                 | SBT                                                                                 | -                                                                                   | -                                                                                   |
| Capacity (veh/h)         | -                                                                                   | -                                                                                   | 302                                                                                 | 697                                                                                 | -                                                                                   | -                                                                                   |
| HCM Lane V/C Ratio       | -                                                                                   | -                                                                                   | 0.004                                                                               | 0.016                                                                               | -                                                                                   | -                                                                                   |
| HCM Control Delay (s)    | -                                                                                   | -                                                                                   | 17                                                                                  | 10.2                                                                                | -                                                                                   | -                                                                                   |
| HCM Lane LOS             | -                                                                                   | -                                                                                   | C                                                                                   | B                                                                                   | -                                                                                   | -                                                                                   |
| HCM 95th %tile Q(veh)    | -                                                                                   | -                                                                                   | 0                                                                                   | 0                                                                                   | -                                                                                   | -                                                                                   |

12239.00 :: Needham Street  
9: Needham Street & North Site Driveway/Charlemont Street

2025 Build Conditions with Shuttle Service  
Timing Plan: Weekday Evening

| Lane Group              | EBL                                                                               | EBT                                                                               | EBR  | WBL                                                                               | WBT                                                                               | WBR  | NBL                                                                               | NBT                                                                               | NBR  | SBL                                                                               | SBT                                                                               | SBR  | Ø3   | Ø7   | Ø9   | Ø10  |
|-------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|------|------|------|------|------|
| Lane Configurations     |  |  |      |  |  |      |  |  |      |  |  |      |      |      |      |      |
| Traffic Volume (vph)    | 175                                                                               | 0                                                                                 | 85   | 35                                                                                | 15                                                                                | 25   | 110                                                                               | 760                                                                               | 25   | 5                                                                                 | 750                                                                               | 115  |      |      |      |      |
| Future Volume (vph)     | 175                                                                               | 0                                                                                 | 85   | 35                                                                                | 15                                                                                | 25   | 110                                                                               | 760                                                                               | 25   | 5                                                                                 | 750                                                                               | 115  |      |      |      |      |
| Ideal Flow (vphpl)      | 1900                                                                              | 1900                                                                              | 1900 | 1900                                                                              | 1900                                                                              | 1900 | 1900                                                                              | 1900                                                                              | 1900 | 1900                                                                              | 1900                                                                              | 1900 |      |      |      |      |
| Storage Length (ft)     | 125                                                                               |                                                                                   | 0    | 125                                                                               |                                                                                   | 0    | 100                                                                               |                                                                                   | 0    | 100                                                                               |                                                                                   | 0    |      |      |      |      |
| Storage Lanes           | 1                                                                                 |                                                                                   | 0    | 1                                                                                 |                                                                                   | 0    | 1                                                                                 |                                                                                   | 0    | 1                                                                                 |                                                                                   | 0    |      |      |      |      |
| Taper Length (ft)       | 25                                                                                |                                                                                   |      | 25                                                                                |                                                                                   |      | 25                                                                                |                                                                                   |      | 25                                                                                |                                                                                   |      |      |      |      |      |
| Satd. Flow (prot)       | 1805                                                                              | 1615                                                                              | 0    | 1805                                                                              | 1721                                                                              | 0    | 1787                                                                              | 1870                                                                              | 0    | 1787                                                                              | 1833                                                                              | 0    |      |      |      |      |
| Flt Permitted           | 0.729                                                                             |                                                                                   |      | 0.697                                                                             |                                                                                   |      | 0.081                                                                             |                                                                                   |      | 0.127                                                                             |                                                                                   |      |      |      |      |      |
| Satd. Flow (perm)       | 1385                                                                              | 1615                                                                              | 0    | 1324                                                                              | 1721                                                                              | 0    | 152                                                                               | 1870                                                                              | 0    | 239                                                                               | 1833                                                                              | 0    |      |      |      |      |
| Right Turn on Red       |                                                                                   |                                                                                   | Yes  |                                                                                   |                                                                                   | Yes  |                                                                                   |                                                                                   | Yes  |                                                                                   |                                                                                   | Yes  |      |      |      |      |
| Satd. Flow (RTOR)       |                                                                                   | 329                                                                               |      |                                                                                   | 27                                                                                |      |                                                                                   | 2                                                                                 |      |                                                                                   | 10                                                                                |      |      |      |      |      |
| Link Speed (mph)        |                                                                                   | 30                                                                                |      |                                                                                   | 30                                                                                |      |                                                                                   | 30                                                                                |      |                                                                                   | 30                                                                                |      |      |      |      |      |
| Link Distance (ft)      |                                                                                   | 491                                                                               |      |                                                                                   | 696                                                                               |      |                                                                                   | 244                                                                               |      |                                                                                   | 497                                                                               |      |      |      |      |      |
| Travel Time (s)         |                                                                                   | 11.2                                                                              |      |                                                                                   | 15.8                                                                              |      |                                                                                   | 5.5                                                                               |      |                                                                                   | 11.3                                                                              |      |      |      |      |      |
| Confl. Peds. (#/hr)     |                                                                                   |                                                                                   |      |                                                                                   |                                                                                   |      | 7                                                                                 |                                                                                   | 3    | 3                                                                                 |                                                                                   | 7    |      |      |      |      |
| Confl. Bikes (#/hr)     |                                                                                   |                                                                                   |      |                                                                                   |                                                                                   |      |                                                                                   | 2                                                                                 |      |                                                                                   |                                                                                   |      |      |      |      |      |
| Peak Hour Factor        | 0.92                                                                              | 0.92                                                                              | 0.92 | 0.92                                                                              | 0.92                                                                              | 0.92 | 0.92                                                                              | 0.92                                                                              | 0.92 | 0.92                                                                              | 0.92                                                                              | 0.92 |      |      |      |      |
| Heavy Vehicles (%)      | 0%                                                                                | 0%                                                                                | 0%   | 0%                                                                                | 0%                                                                                | 0%   | 1%                                                                                | 1%                                                                                | 1%   | 1%                                                                                | 1%                                                                                | 1%   |      |      |      |      |
| Shared Lane Traffic (%) |                                                                                   |                                                                                   |      |                                                                                   |                                                                                   |      |                                                                                   |                                                                                   |      |                                                                                   |                                                                                   |      |      |      |      |      |
| Lane Group Flow (vph)   | 190                                                                               | 92                                                                                | 0    | 38                                                                                | 43                                                                                | 0    | 120                                                                               | 853                                                                               | 0    | 5                                                                                 | 940                                                                               | 0    |      |      |      |      |
| Turn Type               | Perm                                                                              | NA                                                                                |      | Perm                                                                              | NA                                                                                |      | pm+pt                                                                             | NA                                                                                |      | pm+pt                                                                             | NA                                                                                |      |      |      |      |      |
| Protected Phases        |                                                                                   | 4                                                                                 |      |                                                                                   | 8                                                                                 |      | 5                                                                                 | 2                                                                                 |      | 1                                                                                 | 6                                                                                 |      | 3    | 7    | 9    | 10   |
| Permitted Phases        |                                                                                   | 4                                                                                 |      |                                                                                   | 8                                                                                 |      | 2                                                                                 |                                                                                   |      | 6                                                                                 |                                                                                   |      |      |      |      |      |
| Detector Phase          |                                                                                   | 4                                                                                 | 4    |                                                                                   | 8                                                                                 | 8    |                                                                                   | 5                                                                                 | 2    |                                                                                   | 1                                                                                 | 6    |      |      |      |      |
| Switch Phase            |                                                                                   |                                                                                   |      |                                                                                   |                                                                                   |      |                                                                                   |                                                                                   |      |                                                                                   |                                                                                   |      |      |      |      |      |
| Minimum Initial (s)     | 3.0                                                                               | 3.0                                                                               |      | 3.0                                                                               | 3.0                                                                               |      | 3.0                                                                               | 3.0                                                                               |      | 3.0                                                                               | 3.0                                                                               |      | 1.0  | 1.0  | 1.0  | 1.0  |
| Minimum Split (s)       | 23.0                                                                              | 23.0                                                                              |      | 23.0                                                                              | 23.0                                                                              |      | 9.0                                                                               | 22.0                                                                              |      | 9.0                                                                               | 22.0                                                                              |      | 3.0  | 3.0  | 3.0  | 3.0  |
| Total Split (s)         | 26.0                                                                              | 26.0                                                                              |      | 26.0                                                                              | 26.0                                                                              |      | 16.0                                                                              | 56.0                                                                              |      | 16.0                                                                              | 56.0                                                                              |      | 3.0  | 3.0  | 3.0  | 3.0  |
| Total Split (%)         | 25.0%                                                                             | 25.0%                                                                             |      | 25.0%                                                                             | 25.0%                                                                             |      | 15.4%                                                                             | 53.8%                                                                             |      | 15.4%                                                                             | 53.8%                                                                             |      | 3%   | 3%   | 3%   | 3%   |
| Yellow Time (s)         | 4.0                                                                               | 4.0                                                                               |      | 4.0                                                                               | 4.0                                                                               |      | 3.0                                                                               | 4.0                                                                               |      | 3.0                                                                               | 4.0                                                                               |      | 2.0  | 2.0  | 2.0  | 2.0  |
| All-Red Time (s)        | 2.0                                                                               | 2.0                                                                               |      | 2.0                                                                               | 2.0                                                                               |      | 3.0                                                                               | 2.0                                                                               |      | 3.0                                                                               | 2.0                                                                               |      | 0.0  | 0.0  | 0.0  | 0.0  |
| Lost Time Adjust (s)    | 0.0                                                                               | 0.0                                                                               |      | 0.0                                                                               | 0.0                                                                               |      | 0.0                                                                               | 0.0                                                                               |      | 0.0                                                                               | 0.0                                                                               |      |      |      |      |      |
| Total Lost Time (s)     | 6.0                                                                               | 6.0                                                                               |      | 6.0                                                                               | 6.0                                                                               |      | 6.0                                                                               | 6.0                                                                               |      | 6.0                                                                               | 6.0                                                                               |      |      |      |      |      |
| Lead/Lag                | Lag                                                                               | Lag                                                                               |      | Lag                                                                               | Lag                                                                               |      |                                                                                   |                                                                                   | Lead | Lag                                                                               |                                                                                   |      | Lead | Lead | Lag  | Lead |
| Lead-Lag Optimize?      |                                                                                   |                                                                                   |      |                                                                                   |                                                                                   |      |                                                                                   |                                                                                   |      |                                                                                   |                                                                                   |      |      |      |      |      |
| Recall Mode             | None                                                                              | None                                                                              |      | None                                                                              | None                                                                              |      | None                                                                              | Min                                                                               |      | None                                                                              | Min                                                                               |      | None | None | None | None |
| Act Effect Green (s)    | 16.2                                                                              | 16.2                                                                              |      | 16.2                                                                              | 16.2                                                                              |      | 61.7                                                                              | 61.7                                                                              |      | 51.4                                                                              | 50.9                                                                              |      |      |      |      |      |
| Actuated g/C Ratio      | 0.18                                                                              | 0.18                                                                              |      | 0.18                                                                              | 0.18                                                                              |      | 0.67                                                                              | 0.67                                                                              |      | 0.56                                                                              | 0.55                                                                              |      |      |      |      |      |
| v/c Ratio               | 0.79                                                                              | 0.17                                                                              |      | 0.16                                                                              | 0.13                                                                              |      | 0.54                                                                              | 0.68                                                                              |      | 0.02                                                                              | 0.93                                                                              |      |      |      |      |      |
| Control Delay           | 59.7                                                                              | 0.6                                                                               |      | 34.2                                                                              | 18.2                                                                              |      | 33.0                                                                              | 15.3                                                                              |      | 11.4                                                                              | 37.4                                                                              |      |      |      |      |      |
| Queue Delay             | 0.0                                                                               | 0.0                                                                               |      | 0.0                                                                               | 0.0                                                                               |      | 0.0                                                                               | 0.0                                                                               |      | 0.0                                                                               | 0.0                                                                               |      |      |      |      |      |
| Total Delay             | 59.7                                                                              | 0.6                                                                               |      | 34.2                                                                              | 18.2                                                                              |      | 33.0                                                                              | 15.3                                                                              |      | 11.4                                                                              | 37.4                                                                              |      |      |      |      |      |
| LOS                     | E                                                                                 | A                                                                                 |      | C                                                                                 | B                                                                                 |      | C                                                                                 | B                                                                                 |      | B                                                                                 | D                                                                                 |      |      |      |      |      |
| Approach Delay          |                                                                                   | 40.4                                                                              |      |                                                                                   | 25.7                                                                              |      |                                                                                   | 17.4                                                                              |      |                                                                                   | 37.2                                                                              |      |      |      |      |      |
| Approach LOS            |                                                                                   | D                                                                                 |      |                                                                                   | C                                                                                 |      |                                                                                   | B                                                                                 |      |                                                                                   | D                                                                                 |      |      |      |      |      |
| Queue Length 50th (ft)  | 104                                                                               | 0                                                                                 |      | 19                                                                                | 8                                                                                 |      | 21                                                                                | 253                                                                               |      | 1                                                                                 | 471                                                                               |      |      |      |      |      |
| Queue Length 95th (ft)  | #210                                                                              | 0                                                                                 |      | 50                                                                                | 37                                                                                |      | 83                                                                                | #641                                                                              |      | 7                                                                                 | #893                                                                              |      |      |      |      |      |
| Internal Link Dist (ft) |                                                                                   | 411                                                                               |      |                                                                                   | 616                                                                               |      |                                                                                   | 164                                                                               |      |                                                                                   | 417                                                                               |      |      |      |      |      |
| Turn Bay Length (ft)    | 125                                                                               |                                                                                   |      | 125                                                                               |                                                                                   |      | 100                                                                               |                                                                                   |      | 100                                                                               |                                                                                   |      |      |      |      |      |
| Base Capacity (vph)     | 300                                                                               | 607                                                                               |      | 287                                                                               | 394                                                                               |      | 284                                                                               | 1248                                                                              |      | 300                                                                               | 1012                                                                              |      |      |      |      |      |
| Starvation Cap Reductn  | 0                                                                                 | 0                                                                                 |      | 0                                                                                 | 0                                                                                 |      | 0                                                                                 | 0                                                                                 |      | 0                                                                                 | 0                                                                                 |      |      |      |      |      |
| Spillback Cap Reductn   | 0                                                                                 | 0                                                                                 |      | 0                                                                                 | 0                                                                                 |      | 0                                                                                 | 0                                                                                 |      | 0                                                                                 | 0                                                                                 |      |      |      |      |      |
| Storage Cap Reductn     | 0                                                                                 | 0                                                                                 |      | 0                                                                                 | 0                                                                                 |      | 0                                                                                 | 0                                                                                 |      | 0                                                                                 | 0                                                                                 |      |      |      |      |      |
| Reduced v/c Ratio       | 0.63                                                                              | 0.15                                                                              |      | 0.13                                                                              | 0.11                                                                              |      | 0.42                                                                              | 0.68                                                                              |      | 0.02                                                                              | 0.93                                                                              |      |      |      |      |      |

| Intersection Summary                                            |                        |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|-----------------------------------------------------------------|------------------------|--|--|--|--|--|--|--|--|--|--|--|--|--|--|
| Area Type:                                                      | Other                  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Cycle Length:                                                   | 104                    |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Actuated Cycle Length:                                          | 92.5                   |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Natural Cycle:                                                  | 90                     |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Control Type:                                                   | Actuated-Uncoordinated |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Maximum v/c Ratio:                                              | 0.93                   |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Intersection Signal Delay:                                      | 28.8                   |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Intersection Capacity Utilization                               | 84.0%                  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| ICU Level of Service                                            | E                      |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Analysis Period (min)                                           | 15                     |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| # 95th percentile volume exceeds capacity, queue may be longer. |                        |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Queue shown is maximum after two cycles.                        |                        |  |  |  |  |  |  |  |  |  |  |  |  |  |  |



12239.00 :: Needham Street  
10: Needham Street & Tower Road/Industrial Place

2025 Build Conditions with Shuttle Service  
Timing Plan: Weekday Evening

| Intersection                                                                                                         |         |                                                                                     |       |           |                                                                                     |       |        |                                                                                     |      |                                                                                     |                                                                                     |      |
|----------------------------------------------------------------------------------------------------------------------|---------|-------------------------------------------------------------------------------------|-------|-----------|-------------------------------------------------------------------------------------|-------|--------|-------------------------------------------------------------------------------------|------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|------|
| Int Delay, s/veh                                                                                                     | 242.1   |                                                                                     |       |           |                                                                                     |       |        |                                                                                     |      |                                                                                     |                                                                                     |      |
| Movement                                                                                                             | EBL     | EBT                                                                                 | EBR   | WBL       | WBT                                                                                 | WBR   | NBL    | NBT                                                                                 | NBR  | SBL                                                                                 | SBT                                                                                 | SBR  |
| Lane Configurations                                                                                                  |         |  |       |           |  |       |        |  |      |  |  |      |
| Traffic Vol, veh/h                                                                                                   | 105     | 5                                                                                   | 75    | 65        | 5                                                                                   | 45    | 65     | 890                                                                                 | 40   | 20                                                                                  | 730                                                                                 | 90   |
| Future Vol, veh/h                                                                                                    | 105     | 5                                                                                   | 75    | 65        | 5                                                                                   | 45    | 65     | 890                                                                                 | 40   | 20                                                                                  | 730                                                                                 | 90   |
| Conflicting Peds, #/hr                                                                                               | 0       | 0                                                                                   | 8     | 8         | 0                                                                                   | 0     | 9      | 0                                                                                   | 2    | 2                                                                                   | 0                                                                                   | 9    |
| Sign Control                                                                                                         | Stop    | Stop                                                                                | Stop  | Stop      | Stop                                                                                | Stop  | Free   | Free                                                                                | Free | Free                                                                                | Free                                                                                | Free |
| RT Channelized                                                                                                       | -       | -                                                                                   | None  | -         | -                                                                                   | None  | -      | -                                                                                   | None | -                                                                                   | -                                                                                   | None |
| Storage Length                                                                                                       | -       | -                                                                                   | -     | -         | -                                                                                   | -     | -      | -                                                                                   | -    | 100                                                                                 | -                                                                                   | -    |
| Veh in Median Storage, #                                                                                             | -       | 0                                                                                   | -     | -         | 0                                                                                   | -     | -      | 0                                                                                   | -    | -                                                                                   | 0                                                                                   | -    |
| Grade, %                                                                                                             | -       | 0                                                                                   | -     | -         | 0                                                                                   | -     | -      | 0                                                                                   | -    | -                                                                                   | 0                                                                                   | -    |
| Peak Hour Factor                                                                                                     | 92      | 92                                                                                  | 92    | 92        | 92                                                                                  | 92    | 92     | 92                                                                                  | 92   | 92                                                                                  | 92                                                                                  | 92   |
| Heavy Vehicles, %                                                                                                    | 1       | 1                                                                                   | 1     | 1         | 1                                                                                   | 1     | 0      | 0                                                                                   | 0    | 1                                                                                   | 1                                                                                   | 1    |
| Mvmt Flow                                                                                                            | 114     | 5                                                                                   | 82    | 71        | 5                                                                                   | 49    | 71     | 967                                                                                 | 43   | 22                                                                                  | 793                                                                                 | 98   |
|                                                                                                                      |         |                                                                                     |       |           |                                                                                     |       |        |                                                                                     |      |                                                                                     |                                                                                     |      |
| Major/Minor                                                                                                          | Minor2  |                                                                                     |       | Minor1    |                                                                                     |       | Major1 |                                                                                     |      | Major2                                                                              |                                                                                     |      |
| Conflicting Flow All                                                                                                 | 2053    | 2049                                                                                | 859   | 2069      | 2076                                                                                | 991   | 900    | 0                                                                                   | 0    | 1013                                                                                | 0                                                                                   | 0    |
| Stage 1                                                                                                              | 895     | 895                                                                                 | -     | 1132      | 1132                                                                                | -     | -      | -                                                                                   | -    | -                                                                                   | -                                                                                   | -    |
| Stage 2                                                                                                              | 1158    | 1154                                                                                | -     | 937       | 944                                                                                 | -     | -      | -                                                                                   | -    | -                                                                                   | -                                                                                   | -    |
| Critical Hdwy                                                                                                        | 7.11    | 6.51                                                                                | 6.21  | 7.11      | 6.51                                                                                | 6.21  | 4.1    | -                                                                                   | -    | 4.11                                                                                | -                                                                                   | -    |
| Critical Hdwy Stg 1                                                                                                  | 6.11    | 5.51                                                                                | -     | 6.11      | 5.51                                                                                | -     | -      | -                                                                                   | -    | -                                                                                   | -                                                                                   | -    |
| Critical Hdwy Stg 2                                                                                                  | 6.11    | 5.51                                                                                | -     | 6.11      | 5.51                                                                                | -     | -      | -                                                                                   | -    | -                                                                                   | -                                                                                   | -    |
| Follow-up Hdwy                                                                                                       | 3.509   | 4.009                                                                               | 3.309 | 3.509     | 4.009                                                                               | 3.309 | 2.2    | -                                                                                   | -    | 2.209                                                                               | -                                                                                   | -    |
| Pot Cap-1 Maneuver                                                                                                   | ~ 41    | 56                                                                                  | 358   | ~ 40      | 54                                                                                  | 300   | 763    | -                                                                                   | -    | 688                                                                                 | -                                                                                   | -    |
| Stage 1                                                                                                              | 337     | 361                                                                                 | -     | 248       | 279                                                                                 | -     | -      | -                                                                                   | -    | -                                                                                   | -                                                                                   | -    |
| Stage 2                                                                                                              | 240     | 273                                                                                 | -     | 319       | 342                                                                                 | -     | -      | -                                                                                   | -    | -                                                                                   | -                                                                                   | -    |
| Platoon blocked, %                                                                                                   |         |                                                                                     |       |           |                                                                                     |       |        | -                                                                                   | -    | -                                                                                   | -                                                                                   | -    |
| Mov Cap-1 Maneuver                                                                                                   | ~ 25    | 42                                                                                  | 353   | ~ 22      | 41                                                                                  | 300   | 758    | -                                                                                   | -    | 688                                                                                 | -                                                                                   | -    |
| Mov Cap-2 Maneuver                                                                                                   | ~ 25    | 42                                                                                  | -     | ~ 22      | 41                                                                                  | -     | -      | -                                                                                   | -    | -                                                                                   | -                                                                                   | -    |
| Stage 1                                                                                                              | 262     | 347                                                                                 | -     | 194       | 218                                                                                 | -     | -      | -                                                                                   | -    | -                                                                                   | -                                                                                   | -    |
| Stage 2                                                                                                              | 154     | 214                                                                                 | -     | 232       | 329                                                                                 | -     | -      | -                                                                                   | -    | -                                                                                   | -                                                                                   | -    |
|                                                                                                                      |         |                                                                                     |       |           |                                                                                     |       |        |                                                                                     |      |                                                                                     |                                                                                     |      |
| Approach                                                                                                             | EB      |                                                                                     |       | WB        |                                                                                     |       | NB     |                                                                                     |      | SB                                                                                  |                                                                                     |      |
| HCM Control Delay, s                                                                                                 | \$ 1954 |                                                                                     |       | \$ 1343.6 |                                                                                     |       | 0.7    |                                                                                     |      | 0.2                                                                                 |                                                                                     |      |
| HCM LOS                                                                                                              | F       |                                                                                     |       | F         |                                                                                     |       |        |                                                                                     |      |                                                                                     |                                                                                     |      |
|                                                                                                                      |         |                                                                                     |       |           |                                                                                     |       |        |                                                                                     |      |                                                                                     |                                                                                     |      |
| Minor Lane/Major Mvmt                                                                                                | NBL     | NBT                                                                                 | NBR   | EBLn1     | WBLn1                                                                               | SBL   | SBT    | SBR                                                                                 |      |                                                                                     |                                                                                     |      |
| Capacity (veh/h)                                                                                                     | 758     | -                                                                                   | -     | 41        | 36                                                                                  | 688   | -      | -                                                                                   |      |                                                                                     |                                                                                     |      |
| HCM Lane V/C Ratio                                                                                                   | 0.093   | -                                                                                   | -     | 4.905     | 3.472                                                                               | 0.032 | -      | -                                                                                   |      |                                                                                     |                                                                                     |      |
| HCM Control Delay (s)                                                                                                | 10.2    | 0                                                                                   | -     | \$ 1954   | \$ 1343.6                                                                           | 10.4  | -      | -                                                                                   |      |                                                                                     |                                                                                     |      |
| HCM Lane LOS                                                                                                         | B       | A                                                                                   | -     | F         | F                                                                                   | B     | -      | -                                                                                   |      |                                                                                     |                                                                                     |      |
| HCM 95th %ile Q(veh)                                                                                                 | 0.3     | -                                                                                   | -     | 23.3      | 14.4                                                                                | 0.1   | -      | -                                                                                   |      |                                                                                     |                                                                                     |      |
|                                                                                                                      |         |                                                                                     |       |           |                                                                                     |       |        |                                                                                     |      |                                                                                     |                                                                                     |      |
| Notes                                                                                                                |         |                                                                                     |       |           |                                                                                     |       |        |                                                                                     |      |                                                                                     |                                                                                     |      |
| ~: Volume exceeds capacity    \$: Delay exceeds 300s    +: Computation Not Defined    *: All major volume in platoon |         |                                                                                     |       |           |                                                                                     |       |        |                                                                                     |      |                                                                                     |                                                                                     |      |

12239.00 :: Needham Street  
11: Needham Street & Jaconnet Street

2025 Build Conditions with Shuttle Service  
Timing Plan: Weekday Evening

| Intersection             |        |       |        |       |       |      |
|--------------------------|--------|-------|--------|-------|-------|------|
| Int Delay, s/veh         | 9.1    |       |        |       |       |      |
| Movement                 | WBL    | WBR   | NBT    | NBR   | SBL   | SBT  |
| Lane Configurations      | ↵      |       | ↵      |       | ↵     | ↵    |
| Traffic Vol, veh/h       | 55     | 30    | 945    | 30    | 10    | 825  |
| Future Vol, veh/h        | 55     | 30    | 945    | 30    | 10    | 825  |
| Conflicting Peds, #/hr   | 0      | 1     | 0      | 33    | 33    | 0    |
| Sign Control             | Stop   | Stop  | Free   | Free  | Free  | Free |
| RT Channelized           | -      | None  | -      | None  | -     | None |
| Storage Length           | 0      | -     | -      | -     | 100   | -    |
| Veh in Median Storage, # | 0      | -     | 0      | -     | -     | 0    |
| Grade, %                 | 0      | -     | 0      | -     | -     | 0    |
| Peak Hour Factor         | 92     | 92    | 92     | 92    | 92    | 92   |
| Heavy Vehicles, %        | 0      | 0     | 1      | 1     | 1     | 1    |
| Mvmt Flow                | 60     | 33    | 1027   | 33    | 11    | 897  |
| Major/Minor              |        |       |        |       |       |      |
| Minor1                   | Major1 |       | Major2 |       |       |      |
| Conflicting Flow All     | 1994   | 1077  | 0      | 0     | 1093  | 0    |
| Stage 1                  | 1076   | -     | -      | -     | -     | -    |
| Stage 2                  | 918    | -     | -      | -     | -     | -    |
| Critical Hdwy            | 6.4    | 6.2   | -      | -     | 4.11  | -    |
| Critical Hdwy Stg 1      | 5.4    | -     | -      | -     | -     | -    |
| Critical Hdwy Stg 2      | 5.4    | -     | -      | -     | -     | -    |
| Follow-up Hdwy           | 3.5    | 3.3   | -      | -     | 2.209 | -    |
| Pot Cap-1 Maneuver       | 67     | 269   | -      | -     | 642   | -    |
| Stage 1                  | 330    | -     | -      | -     | -     | -    |
| Stage 2                  | 392    | -     | -      | -     | -     | -    |
| Platoon blocked, %       |        |       | -      | -     | -     | -    |
| Mov Cap-1 Maneuver       | 64     | 261   | -      | -     | 641   | -    |
| Mov Cap-2 Maneuver       | 64     | -     | -      | -     | -     | -    |
| Stage 1                  | 321    | -     | -      | -     | -     | -    |
| Stage 2                  | 385    | -     | -      | -     | -     | -    |
| Approach                 |        |       |        |       |       |      |
| WB                       | NB     |       | SB     |       |       |      |
| HCM Control Delay, s     | 201.6  | 0     |        |       | 0.1   |      |
| HCM LOS                  | F      |       |        |       |       |      |
| Minor Lane/Major Mvmt    |        |       |        |       |       |      |
| NBT                      | NBR    | WBLn1 | SBL    | SBT   |       |      |
| Capacity (veh/h)         | -      | -     | 87     | 641   | -     |      |
| HCM Lane V/C Ratio       | -      | -     | 1.062  | 0.017 | -     |      |
| HCM Control Delay (s)    | -      | -     | 201.6  | 10.7  | -     |      |
| HCM Lane LOS             | -      | -     | F      | B     | -     |      |
| HCM 95th %ile Q(veh)     | -      | -     | 6.2    | 0.1   | -     |      |

12239.00 :: Needham Street  
12: Needham Street & Rockland Street

2025 Build Conditions with Shuttle Service  
Timing Plan: Weekday Evening

| Intersection             |        |       |        |       |       |      |
|--------------------------|--------|-------|--------|-------|-------|------|
| Int Delay, s/veh         | 0.4    |       |        |       |       |      |
| Movement                 | WBL    | WBR   | NBT    | NBR   | SBL   | SBT  |
| Lane Configurations      | ↵      |       | ↵      |       | ↵     | ↵    |
| Traffic Vol, veh/h       | 5      | 10    | 990    | 15    | 15    | 845  |
| Future Vol, veh/h        | 5      | 10    | 990    | 15    | 15    | 845  |
| Conflicting Peds, #/hr   | 1      | 0     | 0      | 7     | 7     | 0    |
| Sign Control             | Stop   | Stop  | Free   | Free  | Free  | Free |
| RT Channelized           | -      | None  | -      | None  | -     | None |
| Storage Length           | 0      | -     | -      | -     | 125   | -    |
| Veh in Median Storage, # | 0      | -     | 0      | -     | -     | 0    |
| Grade, %                 | 0      | -     | 0      | -     | -     | 0    |
| Peak Hour Factor         | 92     | 92    | 92     | 92    | 92    | 92   |
| Heavy Vehicles, %        | 0      | 0     | 1      | 1     | 1     | 1    |
| Mvmt Flow                | 5      | 11    | 1076   | 16    | 16    | 918  |
| Major/Minor              |        |       |        |       |       |      |
| Minor1                   | Major1 |       | Major2 |       |       |      |
| Conflicting Flow All     | 2043   | 1091  | 0      | 0     | 1099  | 0    |
| Stage 1                  | 1091   | -     | -      | -     | -     | -    |
| Stage 2                  | 952    | -     | -      | -     | -     | -    |
| Critical Hdwy            | 6.4    | 6.2   | -      | -     | 4.11  | -    |
| Critical Hdwy Stg 1      | 5.4    | -     | -      | -     | -     | -    |
| Critical Hdwy Stg 2      | 5.4    | -     | -      | -     | -     | -    |
| Follow-up Hdwy           | 3.5    | 3.3   | -      | -     | 2.209 | -    |
| Pot Cap-1 Maneuver       | 63     | 264   | -      | -     | 639   | -    |
| Stage 1                  | 325    | -     | -      | -     | -     | -    |
| Stage 2                  | 378    | -     | -      | -     | -     | -    |
| Platoon blocked, %       |        |       | -      | -     | -     | -    |
| Mov Cap-1 Maneuver       | 61     | 262   | -      | -     | 639   | -    |
| Mov Cap-2 Maneuver       | 61     | -     | -      | -     | -     | -    |
| Stage 1                  | 323    | -     | -      | -     | -     | -    |
| Stage 2                  | 368    | -     | -      | -     | -     | -    |
| Approach                 |        |       |        |       |       |      |
| WB                       | NB     |       | SB     |       |       |      |
| HCM Control Delay, s     | 38.1   | 0     |        |       | 0.2   |      |
| HCM LOS                  | E      |       |        |       |       |      |
| Minor Lane/Major Mvmt    |        |       |        |       |       |      |
| NBT                      | NBR    | WBLn1 | SBL    | SBT   |       |      |
| Capacity (veh/h)         | -      | -     | 125    | 639   | -     |      |
| HCM Lane V/C Ratio       | -      | -     | 0.13   | 0.026 | -     |      |
| HCM Control Delay (s)    | -      | -     | 38.1   | 10.8  | -     |      |
| HCM Lane LOS             | -      | -     | E      | B     | -     |      |
| HCM 95th %ile Q(veh)     | -      | -     | 0.4    | 0.1   | -     |      |

12239.00 :: Needham Street  
13: Needham Street & Avalon Driveway/Columbia Avenue

2025 Build Conditions with Shuttle Service  
Timing Plan: Weekday Evening

| Lane Group              | EBL   | EBT   | EBR   | WBL   | WBT   | WBR  | NBL   | NBT   | NBR  | SBL   | SBT   | SBR  | Ø1   | Ø3   | Ø5   | Ø7   |
|-------------------------|-------|-------|-------|-------|-------|------|-------|-------|------|-------|-------|------|------|------|------|------|
| Lane Configurations     |       |       |       |       |       |      |       |       |      |       |       |      |      |      |      |      |
| Traffic Volume (vph)    | 10    | 0     | 15    | 5     | 1     | 5    | 25    | 1025  | 5    | 1     | 795   | 10   |      |      |      |      |
| Future Volume (vph)     | 10    | 0     | 15    | 5     | 1     | 5    | 25    | 1025  | 5    | 1     | 795   | 10   |      |      |      |      |
| Ideal Flow (vphpl)      | 1900  | 1900  | 1900  | 1900  | 1900  | 1900 | 1900  | 1900  | 1900 | 1900  | 1900  | 1900 |      |      |      |      |
| Storage Length (ft)     | 0     |       | 50    | 0     |       | 0    | 125   | 0     |      | 100   | 0     | 0    |      |      |      |      |
| Storage Lanes           | 0     |       | 1     | 0     |       | 0    | 1     | 0     |      | 1     | 0     | 0    |      |      |      |      |
| Taper Length (ft)       | 25    |       |       | 25    |       |      | 25    |       |      | 25    |       | 0    |      |      |      |      |
| Satd. Flow (prot)       | 0     | 1805  | 1615  | 0     | 1597  | 0    | 1787  | 1879  | 0    | 1787  | 1876  | 0    |      |      |      |      |
| Flt Permitted           |       |       |       |       |       |      | 0.269 |       |      | 0.141 |       |      |      |      |      |      |
| Satd. Flow (perm)       | 0     | 1889  | 1571  | 0     | 1627  | 0    | 506   | 1879  | 0    | 265   | 1876  | 0    |      |      |      |      |
| Right Turn on Red       |       | Yes   |       |       | Yes   |      |       | Yes   |      |       | Yes   |      |      |      |      |      |
| Satd. Flow (RTOR)       |       | 80    |       |       | 5     |      |       | 1     |      |       | 2     |      |      |      |      |      |
| Link Speed (mph)        |       | 30    |       |       | 30    |      |       | 30    |      |       | 30    |      |      |      |      |      |
| Link Distance (ft)      |       | 190   |       |       | 435   |      |       | 338   |      |       | 1135  |      |      |      |      |      |
| Travel Time (s)         |       | 4.3   |       |       | 9.9   |      |       | 7.7   |      |       | 25.8  |      |      |      |      |      |
| Confl. Peds. (#/hr)     | 2     |       | 2     | 2     |       | 2    | 9     |       | 5    | 5     |       | 9    |      |      |      |      |
| Peak Hour Factor        | 0.92  | 0.92  | 0.92  | 0.92  | 0.92  | 0.92 | 0.92  | 0.92  | 0.92 | 0.92  | 0.92  | 0.92 |      |      |      |      |
| Heavy Vehicles (%)      | 0%    | 0%    | 0%    | 8%    | 8%    | 8%   | 8%    | 1%    | 1%   | 1%    | 1%    | 1%   |      |      |      |      |
| Shared Lane Traffic (%) |       |       |       |       |       |      |       |       |      |       |       |      |      |      |      |      |
| Lane Group Flow (vph)   | 0     | 11    | 16    | 0     | 11    | 0    | 27    | 1119  | 0    | 1     | 875   | 0    |      |      |      |      |
| Turn Type               | Perm  | NA    | Perm  | Perm  | NA    | Perm | NA    | Perm  | NA   | Perm  | NA    |      |      |      |      |      |
| Protected Phases        |       | 4     |       |       | 8     |      |       | 2     |      | 6     |       |      | 1    | 3    | 5    | 7    |
| Permitted Phases        | 4     |       | 4     | 8     |       |      | 2     |       | 6    |       |       |      |      |      |      |      |
| Detector Phase          | 4     | 4     | 4     | 8     | 8     |      | 2     | 2     |      | 6     | 6     |      |      |      |      |      |
| Switch Phase            |       |       |       |       |       |      |       |       |      |       |       |      |      |      |      |      |
| Minimum Initial (s)     | 4.0   | 4.0   | 4.0   | 4.0   | 4.0   |      | 10.0  | 10.0  |      | 10.0  | 10.0  |      | 1.0  | 1.0  | 1.0  | 1.0  |
| Minimum Split (s)       | 19.0  | 19.0  | 19.0  | 22.0  | 22.0  |      | 16.0  | 16.0  |      | 20.0  | 20.0  |      | 3.0  | 3.0  | 3.0  | 3.0  |
| Total Split (s)         | 18.0  | 18.0  | 18.0  | 18.0  | 18.0  |      | 71.0  | 71.0  |      | 71.0  | 71.0  |      | 3.0  | 3.0  | 3.0  | 3.0  |
| Total Split (%)         | 18.9% | 18.9% | 18.9% | 18.9% | 18.9% |      | 74.7% | 74.7% |      | 74.7% | 74.7% |      | 3%   | 3%   | 3%   | 3%   |
| Yellow Time (s)         | 4.0   | 4.0   | 4.0   | 4.0   | 4.0   |      | 4.0   | 4.0   |      | 4.0   | 4.0   |      | 2.0  | 2.0  | 2.0  | 2.0  |
| All-Red Time (s)        | 2.0   | 2.0   | 2.0   | 2.0   | 2.0   |      | 2.0   | 2.0   |      | 2.0   | 2.0   |      | 0.0  | 0.0  | 0.0  | 0.0  |
| Last Time Adjust (s)    | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   |      | 0.0   | 0.0   |      | 0.0   | 0.0   |      |      |      |      |      |
| Total Lost Time (s)     | 6.0   | 6.0   |       | 6.0   |       | 6.0  | 6.0   |       | 6.0  | 6.0   |       |      |      |      |      |      |
| Lead/Lag                | Lag   | Lag   | Lag   | Lag   | Lag   | Lag  | Lag   | Lag   | Lag  | Lag   | Lag   | Lead | Lead | Lead | Lead |      |
| Lead-Lag Optimize?      |       |       |       |       |       |      |       |       |      |       |       |      |      |      |      |      |
| Recall Mode             | None  | None  | None  | None  | None  | None | None  | None  | None | None  | None  | None | None | None | None | None |
| Act Effct Green (s)     | 7.6   | 7.6   |       | 7.6   |       | 43.8 | 43.8  |       | 43.8 | 43.8  |       |      |      |      |      |      |
| Actuated g/C Ratio      | 0.15  | 0.15  |       | 0.15  |       | 0.88 | 0.88  |       | 0.88 | 0.88  |       |      |      |      |      |      |
| v/c Ratio               | 0.04  | 0.05  |       | 0.04  |       | 0.06 | 0.68  |       | 0.00 | 0.53  |       |      |      |      |      |      |
| Control Delay           | 30.0  | 0.3   |       | 24.8  |       | 4.3  | 9.3   |       | 4.0  | 6.1   |       |      |      |      |      |      |
| Queue Delay             | 0.0   | 0.0   |       | 0.0   |       | 0.0  | 0.0   |       | 0.0  | 0.0   |       |      |      |      |      |      |
| Total Delay             | 30.0  | 0.3   |       | 24.8  |       | 4.3  | 9.3   |       | 4.0  | 6.1   |       |      |      |      |      |      |
| LOS                     | C     | A     |       | C     |       | A    | A     |       | A    | A     |       |      |      |      |      |      |
| Approach Delay          | 12.4  |       |       | 24.8  |       |      | 9.2   |       |      | 6.1   |       |      |      |      |      |      |
| Approach LOS            | B     |       |       | C     |       | A    | A     |       |      | A     |       |      |      |      |      |      |
| Queue Length 50th (ft)  | 2     | 0     |       | 1     |       | 0    | 0     |       | 0    | 0     |       |      |      |      |      |      |
| Queue Length 95th (ft)  | 22    | 0     |       | 19    |       | 16   | #911  |       | 2    | 464   |       |      |      |      |      |      |
| Internal Link Dist (ft) | 110   |       |       | 355   |       |      | 258   |       |      | 1055  |       |      |      |      |      |      |
| Turn Bay Length (ft)    |       | 50    |       |       |       | 125  |       |       | 100  |       |       |      |      |      |      |      |
| Base Capacity (vph)     | 638   | 583   |       | 552   |       | 465  | 1729  |       | 244  | 1726  |       |      |      |      |      |      |
| Starvation Cap Reductn  | 0     | 0     |       | 0     |       | 0    | 0     |       | 0    | 0     |       |      |      |      |      |      |
| Spillback Cap Reductn   | 0     | 0     |       | 0     |       | 0    | 0     |       | 0    | 0     |       |      |      |      |      |      |
| Storage Cap Reductn     | 0     | 0     |       | 0     |       | 0    | 0     |       | 0    | 0     |       |      |      |      |      |      |
| Reduced v/c Ratio       | 0.02  | 0.03  |       | 0.02  |       | 0.06 | 0.65  |       | 0.00 | 0.51  |       |      |      |      |      |      |

| Intersection Summary                                            |                        |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|-----------------------------------------------------------------|------------------------|--|--|--|--|--|--|--|--|--|--|--|--|--|--|
| Area Type:                                                      | Other                  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Cycle Length: 95                                                |                        |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Actuated Cycle Length: 49.8                                     |                        |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Natural Cycle: 90                                               |                        |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Control Type: Actuated-Uncoordinated                            |                        |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Maximum v/c Ratio: 0.68                                         |                        |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Intersection Signal Delay: 8.0                                  | Intersection LOS: A    |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Intersection Capacity Utilization 70.0%                         | ICU Level of Service C |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Analysis Period (min) 15                                        |                        |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| # 95th percentile volume exceeds capacity, queue may be longer. |                        |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Queue shown is maximum after two cycles.                        |                        |  |  |  |  |  |  |  |  |  |  |  |  |  |  |

Splits and Phases: 13: Needham Street & Avalon Driveway/Columbia Avenue



12239.00 :: Needham Street  
14: Winchester Street & Needham Street/Dedham Street

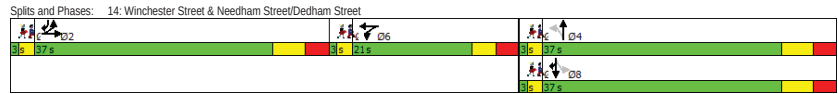
2025 Build Conditions with Shuttle Service  
Timing Plan: Weekday Evening

|                          |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|--------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
| Lane Group               | EBL                                                                                 | EBT                                                                                 | EBR                                                                                 | WBL                                                                                 | WBT                                                                                 | WBR                                                                                 | NBL                                                                                 | NBT                                                                                 | NBR                                                                                 | SBL                                                                                 | SBT                                                                                 | SBR                                                                                 | Ø1                                                                                  | Ø3                                                                                  | Ø5                                                                                  | Ø7                                                                                  |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Lane Configurations      |  |  |                                                                                     |                                                                                     |  |  |  |  |                                                                                     |                                                                                     |  |  |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Traffic Volume (vph)     | 815                                                                                 | 130                                                                                 | 55                                                                                  | 20                                                                                  | 100                                                                                 | 85                                                                                  | 30                                                                                  | 345                                                                                 | 15                                                                                  | 65                                                                                  | 305                                                                                 | 640                                                                                 |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Future Volume (vph)      | 815                                                                                 | 130                                                                                 | 55                                                                                  | 20                                                                                  | 100                                                                                 | 85                                                                                  | 30                                                                                  | 345                                                                                 | 15                                                                                  | 65                                                                                  | 305                                                                                 | 640                                                                                 |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Ideal Flow (vphpl)       | 1900                                                                                | 1900                                                                                | 1900                                                                                | 1900                                                                                | 1900                                                                                | 1900                                                                                | 1900                                                                                | 1900                                                                                | 1900                                                                                | 1900                                                                                | 1900                                                                                | 1900                                                                                |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Storage Length (ft)      | 340                                                                                 |                                                                                     | 75                                                                                  | 0                                                                                   |                                                                                     | 0                                                                                   | 100                                                                                 | 0                                                                                   |                                                                                     | 0                                                                                   | 0                                                                                   | 0                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Storage Lanes            | 1                                                                                   |                                                                                     | 1                                                                                   | 0                                                                                   |                                                                                     | 0                                                                                   | 1                                                                                   | 0                                                                                   |                                                                                     | 0                                                                                   | 0                                                                                   | 1                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Taper Length (ft)        | 25                                                                                  |                                                                                     |                                                                                     | 25                                                                                  |                                                                                     |                                                                                     | 25                                                                                  |                                                                                     |                                                                                     |                                                                                     | 25                                                                                  |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Satd. Flow (prot)        | 3502                                                                                | 1814                                                                                | 0                                                                                   | 0                                                                                   | 1785                                                                                | 0                                                                                   | 1805                                                                                | 1887                                                                                | 0                                                                                   | 0                                                                                   | 1864                                                                                | 1599                                                                                |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Flt Permitted            | 0.950                                                                               |                                                                                     |                                                                                     |                                                                                     | 0.995                                                                               |                                                                                     | 0.338                                                                               |                                                                                     |                                                                                     |                                                                                     | 0.618                                                                               |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Satd. Flow (perm)        | 3502                                                                                | 1814                                                                                | 0                                                                                   | 0                                                                                   | 1785                                                                                | 0                                                                                   | 638                                                                                 | 1887                                                                                | 0                                                                                   | 0                                                                                   | 1163                                                                                | 1599                                                                                |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Right Turn on Red        |                                                                                     |                                                                                     | Yes                                                                                 |                                                                                     |                                                                                     | Yes                                                                                 |                                                                                     |                                                                                     | No                                                                                  |                                                                                     |                                                                                     | Yes                                                                                 |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Satd. Flow (RTOR)        |                                                                                     |                                                                                     | 21                                                                                  |                                                                                     |                                                                                     | 28                                                                                  |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     | 524                                                                                 |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Link Speed (mph)         |                                                                                     |                                                                                     | 30                                                                                  |                                                                                     |                                                                                     | 30                                                                                  |                                                                                     |                                                                                     | 30                                                                                  |                                                                                     |                                                                                     | 30                                                                                  |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Link Distance (ft)       |                                                                                     |                                                                                     | 1135                                                                                |                                                                                     |                                                                                     | 451                                                                                 |                                                                                     |                                                                                     | 634                                                                                 |                                                                                     |                                                                                     | 722                                                                                 |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Travel Time (s)          |                                                                                     |                                                                                     | 25.8                                                                                |                                                                                     |                                                                                     | 10.3                                                                                |                                                                                     |                                                                                     | 14.4                                                                                |                                                                                     |                                                                                     | 16.4                                                                                |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Confl. Peds. (#/hr)      |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     | 8                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     | 8                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Confl. Bikes (#/hr)      |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     | 1                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Peak Hour Factor         | 0.92                                                                                | 0.92                                                                                | 0.92                                                                                | 0.92                                                                                | 0.92                                                                                | 0.92                                                                                | 0.92                                                                                | 0.92                                                                                | 0.92                                                                                | 0.92                                                                                | 0.92                                                                                | 0.92                                                                                |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Heavy Vehicles (%)       | 0%                                                                                  | 0%                                                                                  | 0%                                                                                  | 0%                                                                                  | 0%                                                                                  | 0%                                                                                  | 0%                                                                                  | 0%                                                                                  | 0%                                                                                  | 0%                                                                                  | 1%                                                                                  | 1%                                                                                  | 1%                                                                                  |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Shared Lane Traffic (%)  |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Lane Group Flow (vph)    | 886                                                                                 | 201                                                                                 | 0                                                                                   | 0                                                                                   | 223                                                                                 | 0                                                                                   | 33                                                                                  | 391                                                                                 | 0                                                                                   | 0                                                                                   | 403                                                                                 | 696                                                                                 |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Turn Type                | Split                                                                               | NA                                                                                  |                                                                                     | Split                                                                               | NA                                                                                  |                                                                                     | Perm                                                                                | NA                                                                                  |                                                                                     | Perm                                                                                | NA                                                                                  | pt+ov                                                                               |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Protected Phases         | 2                                                                                   | 2                                                                                   |                                                                                     | 6                                                                                   | 6                                                                                   |                                                                                     | 4                                                                                   |                                                                                     | 4                                                                                   |                                                                                     | 8                                                                                   | 2                                                                                   | 8                                                                                   | 2                                                                                   | 8                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Permitted Phases         |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     | 4                                                                                   |                                                                                     | 4                                                                                   |                                                                                     | 8                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Detector Phase           | 2                                                                                   | 2                                                                                   |                                                                                     | 6                                                                                   | 6                                                                                   |                                                                                     | 4                                                                                   |                                                                                     | 4                                                                                   |                                                                                     | 8                                                                                   | 8                                                                                   | 2                                                                                   | 8                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Switch Phase             |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Minimum Initial (s)      | 10.0                                                                                | 10.0                                                                                |                                                                                     | 6.0                                                                                 | 6.0                                                                                 |                                                                                     | 6.0                                                                                 | 6.0                                                                                 |                                                                                     | 6.0                                                                                 | 6.0                                                                                 |                                                                                     | 1.0                                                                                 | 1.0                                                                                 | 1.0                                                                                 | 1.0                                                                                 |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Minimum Split (s)        | 17.0                                                                                | 17.0                                                                                |                                                                                     | 19.0                                                                                | 19.0                                                                                |                                                                                     | 20.0                                                                                | 20.0                                                                                |                                                                                     | 36.0                                                                                | 36.0                                                                                |                                                                                     | 3.0                                                                                 | 3.0                                                                                 | 3.0                                                                                 | 3.0                                                                                 |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Total Split (s)          | 37.0                                                                                | 37.0                                                                                |                                                                                     | 21.0                                                                                | 21.0                                                                                |                                                                                     | 37.0                                                                                | 37.0                                                                                |                                                                                     | 37.0                                                                                | 37.0                                                                                |                                                                                     | 3.0                                                                                 | 3.0                                                                                 | 3.0                                                                                 | 3.0                                                                                 |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Total Split (%)          | 35.6%                                                                               | 35.6%                                                                               |                                                                                     | 20.2%                                                                               | 20.2%                                                                               |                                                                                     | 35.6%                                                                               | 35.6%                                                                               |                                                                                     | 35.6%                                                                               | 35.6%                                                                               |                                                                                     | 3%                                                                                  | 3%                                                                                  | 3%                                                                                  | 3%                                                                                  |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Yellow Time (s)          | 4.0                                                                                 | 4.0                                                                                 |                                                                                     | 3.0                                                                                 | 3.0                                                                                 |                                                                                     | 4.0                                                                                 | 4.0                                                                                 |                                                                                     | 4.0                                                                                 | 4.0                                                                                 |                                                                                     | 2.0                                                                                 | 2.0                                                                                 | 2.0                                                                                 | 2.0                                                                                 |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| All-Red Time (s)         | 3.0                                                                                 | 3.0                                                                                 |                                                                                     | 3.0                                                                                 | 3.0                                                                                 |                                                                                     | 3.0                                                                                 | 3.0                                                                                 |                                                                                     | 3.0                                                                                 | 3.0                                                                                 |                                                                                     | 0.0                                                                                 | 0.0                                                                                 | 0.0                                                                                 | 0.0                                                                                 |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Last Time Adjust (s)     | 0.0                                                                                 | 0.0                                                                                 |                                                                                     | 0.0                                                                                 | 0.0                                                                                 |                                                                                     | 0.0                                                                                 | 0.0                                                                                 |                                                                                     | 0.0                                                                                 | 0.0                                                                                 |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Total Lost Time (s)      | 7.0                                                                                 | 7.0                                                                                 |                                                                                     | 6.0                                                                                 | 7.0                                                                                 |                                                                                     | 7.0                                                                                 | 7.0                                                                                 |                                                                                     | 7.0                                                                                 | 7.0                                                                                 |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Lead/Lag                 | Lag                                                                                 | Lag                                                                                 |                                                                                     | Lag                                                                                 | Lag                                                                                 |                                                                                     | Lag                                                                                 | Lag                                                                                 |                                                                                     | Lag                                                                                 | Lag                                                                                 |                                                                                     | Lead                                                                                | Lead                                                                                | Lead                                                                                | Lead                                                                                |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Lead-Lag Optimize?       |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Recall Mode              | None                                                                                | None                                                                                |                                                                                     | None                                                                                | None                                                                                |                                                                                     | None                                                                                | None                                                                                |                                                                                     | None                                                                                | None                                                                                |                                                                                     | None                                                                                | None                                                                                | None                                                                                | None                                                                                |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Act Effct Green (s)      | 28.7                                                                                | 28.7                                                                                |                                                                                     | 13.4                                                                                |                                                                                     | 30.7                                                                                | 30.7                                                                                |                                                                                     | 30.1                                                                                | 65.8                                                                                |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Actuated g/C Ratio       | 0.31                                                                                | 0.31                                                                                |                                                                                     | 0.14                                                                                |                                                                                     | 0.33                                                                                | 0.33                                                                                |                                                                                     | 0.32                                                                                | 0.71                                                                                |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| v/c Ratio                | 0.82                                                                                | 0.35                                                                                |                                                                                     | 0.80                                                                                |                                                                                     | 0.16                                                                                | 0.63                                                                                |                                                                                     | 1.07                                                                                | 0.54                                                                                |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Control Delay            | 37.2                                                                                | 24.5                                                                                |                                                                                     | 55.3                                                                                |                                                                                     | 25.6                                                                                | 32.3                                                                                |                                                                                     | 99.5                                                                                | 3.2                                                                                 |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Queue Delay              | 0.0                                                                                 | 0.0                                                                                 |                                                                                     | 0.0                                                                                 |                                                                                     | 0.0                                                                                 | 0.0                                                                                 |                                                                                     | 0.0                                                                                 | 0.0                                                                                 |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Total Delay              | 37.2                                                                                | 24.5                                                                                |                                                                                     | 55.3                                                                                |                                                                                     | 25.6                                                                                | 32.3                                                                                |                                                                                     | 99.5                                                                                | 3.2                                                                                 |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| LOS                      | D                                                                                   | C                                                                                   |                                                                                     | E                                                                                   |                                                                                     | C                                                                                   | C                                                                                   |                                                                                     | F                                                                                   | A                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Approach Delay           |                                                                                     | 34.9                                                                                |                                                                                     | 55.3                                                                                |                                                                                     |                                                                                     | 31.8                                                                                |                                                                                     |                                                                                     | 38.5                                                                                |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Approach LOS             |                                                                                     | C                                                                                   |                                                                                     | E                                                                                   |                                                                                     |                                                                                     | C                                                                                   |                                                                                     |                                                                                     | D                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Queue Length 50th (ft)   | 250                                                                                 | 82                                                                                  |                                                                                     | 113                                                                                 |                                                                                     | 14                                                                                  | 202                                                                                 |                                                                                     |                                                                                     | ~277                                                                                | 30                                                                                  |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Queue Length 95th (ft)   | 339                                                                                 | 148                                                                                 |                                                                                     | #229                                                                                |                                                                                     | 38                                                                                  | 301                                                                                 |                                                                                     |                                                                                     | #477                                                                                | 81                                                                                  |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Internal Link Delay (ft) |                                                                                     | 1055                                                                                |                                                                                     | 371                                                                                 |                                                                                     |                                                                                     | 554                                                                                 |                                                                                     |                                                                                     | 642                                                                                 |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Turn Bay Length (ft)     | 340                                                                                 |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     | 100                                                                                 |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Base Capacity (vph)      | 1135                                                                                | 602                                                                                 |                                                                                     | 312                                                                                 |                                                                                     | 210                                                                                 | 623                                                                                 |                                                                                     |                                                                                     | 377                                                                                 | 1302                                                                                |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Starvation Cap Reductn   | 0                                                                                   | 0                                                                                   |                                                                                     | 0                                                                                   |                                                                                     | 0                                                                                   | 0                                                                                   |                                                                                     |                                                                                     | 0                                                                                   | 0                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Spillback Cap Reductn    | 0                                                                                   | 0                                                                                   |                                                                                     | 0                                                                                   |                                                                                     | 0                                                                                   | 0                                                                                   |                                                                                     |                                                                                     | 0                                                                                   | 0                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Storage Cap Reductn      | 0                                                                                   | 0                                                                                   |                                                                                     | 0                                                                                   |                                                                                     | 0                                                                                   | 0                                                                                   |                                                                                     |                                                                                     | 0                                                                                   | 0                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Reduced v/c Ratio        | 0.78                                                                                | 0.33                                                                                |                                                                                     | 0.71                                                                                |                                                                                     | 0.16                                                                                | 0.63                                                                                |                                                                                     |                                                                                     | 1.07                                                                                | 0.53                                                                                |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |



12239.00 :: Needham Street  
14: Winchester Street & Needham Street/Dedham Street

2025 Build Conditions with Shuttle Service  
Timing Plan: Weekday Evening



12239.00 :: Needham Street  
15: Winchester Street & Route 9 EB Access Road

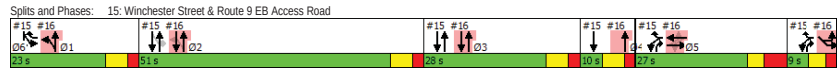
2025 Build Conditions with Shuttle Service  
Timing Plan: Weekday Evening

| Lane Group              | WBL   | WBR    | NBT   | NBR    | SBL    | SBT     | Ø2   | Ø3   | Ø4   | Ø5   | Ø6   |
|-------------------------|-------|--------|-------|--------|--------|---------|------|------|------|------|------|
| Lane Configurations     | ↔     | ↔      | ↔     | ↔      | ↔      | ↔       |      |      |      |      |      |
| Traffic Volume (vph)    | 55    | 140    | 1040  | 305    | 125    | 1055    |      |      |      |      |      |
| Future Volume (vph)     | 55    | 140    | 1040  | 305    | 125    | 1055    |      |      |      |      |      |
| Ideal Flow (vphpl)      | 1900  | 1900   | 1900  | 1900   | 1900   | 1900    |      |      |      |      |      |
| Storage Length (ft)     | 200   | 0      |       | 100    | 0      |         |      |      |      |      |      |
| Storage Lanes           | 1     | 1      |       | 1      | 1      |         |      |      |      |      |      |
| Taper Length (ft)       | 25    |        |       |        | 25     |         |      |      |      |      |      |
| Satd. Flow (prot)       | 1787  | 1599   | 1900  | 1615   | 1787   | 1881    |      |      |      |      |      |
| Flt Permitted           | 0.950 |        |       |        | 0.089  |         |      |      |      |      |      |
| Satd. Flow (perm)       | 1787  | 1599   | 1900  | 1527   | 167    | 1881    |      |      |      |      |      |
| Right Turn on Red       |       | Yes    |       | Yes    |        |         |      |      |      |      |      |
| Satd. Flow (RTOR)       |       | 107    |       | 71     |        |         |      |      |      |      |      |
| Link Speed (mph)        | 30    |        | 30    |        |        | 30      |      |      |      |      |      |
| Link Distance (ft)      | 443   |        | 400   |        |        | 252     |      |      |      |      |      |
| Travel Time (s)         | 10.1  |        | 9.1   |        |        | 5.7     |      |      |      |      |      |
| Confl. Peds. (#/hr)     |       |        |       | 9      | 9      |         |      |      |      |      |      |
| Peak Hour Factor        | 0.92  | 0.92   | 0.92  | 0.92   | 0.92   | 0.92    |      |      |      |      |      |
| Heavy Vehicles (%)      | 1%    | 1%     | 0%    | 0%     | 1%     | 1%      |      |      |      |      |      |
| Shared Lane Traffic (%) |       |        |       |        |        |         |      |      |      |      |      |
| Lane Group Flow (vph)   | 60    | 152    | 1130  | 332    | 136    | 1147    |      |      |      |      |      |
| Turn Type               | Prot  | custom | NA    | custom | custom | NA      |      |      |      |      |      |
| Protected Phases        | 5 6   | 1 5 6  | 2 3   | 5 6    | 1      | 1 2 3 4 | 2    | 3    | 4    | 5    | 6    |
| Permitted Phases        |       |        |       | 2      | 2      |         |      |      |      |      |      |
| Detector Phase          | 5 6   | 1 5 6  | 2 3   | 5 6    | 1      | 1 2 3 4 |      |      |      |      |      |
| Switch Phase            |       |        |       |        |        |         |      |      |      |      |      |
| Minimum Initial (s)     |       |        |       |        | 4.0    |         | 10.0 | 10.0 | 4.0  | 4.0  | 4.0  |
| Minimum Split (s)       |       |        |       |        | 10.0   |         | 25.0 | 27.0 | 10.0 | 11.0 | 9.0  |
| Total Split (s)         |       |        |       |        | 23.0   |         | 51.0 | 28.0 | 10.0 | 27.0 | 9.0  |
| Total Split (%)         |       |        |       |        | 15.5%  |         | 34%  | 19%  | 7%   | 18%  | 6%   |
| Yellow Time (s)         |       |        |       |        | 4.0    |         | 4.0  | 4.0  | 4.0  | 3.0  | 3.0  |
| All-Red Time (s)        |       |        |       |        | 2.0    |         | 2.0  | 2.0  | 2.0  | 4.0  | 2.0  |
| Lost Time Adjust (s)    |       |        |       |        | 0.0    |         |      |      |      |      |      |
| Total Lost Time (s)     |       |        |       |        | 6.0    |         |      |      |      |      |      |
| Lead/Lag                |       |        |       |        | Lead   |         | Lag  | Lead | Lag  | Lead | Lag  |
| Lead-Lag Optimize?      |       |        |       |        |        |         |      |      |      |      |      |
| Recall Mode             |       |        |       |        | None   |         | None | None | None | None | None |
| Act Effct Green (s)     | 28.3  | 52.3   | 73.0  | 72.3   | 62.0   | 106.0   |      |      |      |      |      |
| Actuated g/C Ratio      | 0.19  | 0.36   | 0.50  | 0.49   | 0.42   | 0.72    |      |      |      |      |      |
| v/c Ratio               | 0.17  | 0.24   | 1.20  | 0.41   | 0.53   | 0.85    |      |      |      |      |      |
| Control Delay           | 51.2  | 11.9   | 134.5 | 11.2   | 47.6   | 10.1    |      |      |      |      |      |
| Queue Delay             | 0.0   | 0.1    | 0.1   | 0.0    | 3.4    | 48.7    |      |      |      |      |      |
| Total Delay             | 51.2  | 12.0   | 134.6 | 11.2   | 51.0   | 58.8    |      |      |      |      |      |
| LOS                     | D     | B      | F     | B      | D      | E       |      |      |      |      |      |
| Approach Delay          | 23.1  |        | 106.6 |        |        | 58.0    |      |      |      |      |      |
| Approach LOS            | C     |        | F     |        |        | E       |      |      |      |      |      |
| Queue Length 50th (ft)  | 49    | 29     | ~1323 | 85     | 94     | 167     |      |      |      |      |      |
| Queue Length 95th (ft)  | 93    | 81     | #1589 | 129    | m69    | m136    |      |      |      |      |      |
| Internal Link Dist (ft) | 363   |        | 320   |        |        | 172     |      |      |      |      |      |
| Turn Bay Length (ft)    | 200   |        |       | 100    |        |         |      |      |      |      |      |
| Base Capacity (vph)     | 334   | 631    | 941   | 795    | 257    | 1353    |      |      |      |      |      |
| Starvation Cap Reductn  | 0     | 0      | 0     | 0      | 59     | 453     |      |      |      |      |      |
| Spillback Cap Reductn   | 0     | 79     | 25    | 0      | 0      | 0       |      |      |      |      |      |
| Storage Cap Reductn     | 0     | 0      | 0     | 0      | 0      | 0       |      |      |      |      |      |
| Reduced v/c Ratio       | 0.18  | 0.28   | 1.23  | 0.42   | 0.69   | 1.27    |      |      |      |      |      |

|                                                                   |  |  |  |  |  |  |  |  |  |  |  |
|-------------------------------------------------------------------|--|--|--|--|--|--|--|--|--|--|--|
| Intersection Summary                                              |  |  |  |  |  |  |  |  |  |  |  |
| Area Type: Other                                                  |  |  |  |  |  |  |  |  |  |  |  |
| Cycle Length: 148                                                 |  |  |  |  |  |  |  |  |  |  |  |
| Actuated Cycle Length: 147.3                                      |  |  |  |  |  |  |  |  |  |  |  |
| Natural Cycle: 145                                                |  |  |  |  |  |  |  |  |  |  |  |
| Control Type: Actuated-Uncoordinated                              |  |  |  |  |  |  |  |  |  |  |  |
| Maximum v/c Ratio: 1.32                                           |  |  |  |  |  |  |  |  |  |  |  |
| Intersection Signal Delay: 79.5                                   |  |  |  |  |  |  |  |  |  |  |  |
| Intersection Capacity Utilization 80.8%                           |  |  |  |  |  |  |  |  |  |  |  |
| Analysis Period (min): 15                                         |  |  |  |  |  |  |  |  |  |  |  |
| Volume exceeds capacity, queue is theoretically infinite.         |  |  |  |  |  |  |  |  |  |  |  |
| Queue shown is maximum after two cycles.                          |  |  |  |  |  |  |  |  |  |  |  |
| # 95th percentile volume exceeds capacity, queue may be longer.   |  |  |  |  |  |  |  |  |  |  |  |
| Queue shown is maximum after two cycles.                          |  |  |  |  |  |  |  |  |  |  |  |
| m Volume for 95th percentile queue is metered by upstream signal. |  |  |  |  |  |  |  |  |  |  |  |

12239.00 :: Needham Street  
15: Winchester Street & Route 9 EB Access Road

2025 Build Conditions with Shuttle Service  
Timing Plan: Weekday Evening

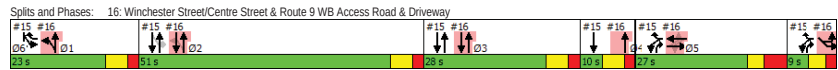


12239.00 :: Needham Street  
16: Winchester Street/Centre Street & Route 9 WB Access Road & Driveway

2025 Build Conditions with Shuttle Service  
Timing Plan: Weekday Evening

| Lane Group                                                        | EBL   | EBT   | EBR  | WBL   | WBT   | WBR2 | NBL2   | NBT  | SBT   | SBR   | SEL  | SER  | Ø2   | Ø3   | Ø4   |
|-------------------------------------------------------------------|-------|-------|------|-------|-------|------|--------|------|-------|-------|------|------|------|------|------|
| Lane Configurations                                               |       | EBT   | EBR  | WBL   | WBT   | WBR2 | NBL2   | NBT  | SBT   | SBR   | SEL  | SER  |      |      |      |
| Traffic Volume (vph)                                              | 5     | 0     | 35   | 155   | 10    | 20   | 155    | 1025 | 990   | 115   | 0    | 1    |      |      |      |
| Future Volume (vph)                                               | 5     | 0     | 35   | 155   | 10    | 20   | 155    | 1025 | 990   | 115   | 0    | 1    |      |      |      |
| Ideal Flow (vphpl)                                                | 1900  | 1900  | 1900 | 1900  | 1900  | 1900 | 1900   | 1900 | 1900  | 1900  | 1900 | 1900 |      |      |      |
| Storage Length (ft)                                               | 0     |       |      | 100   |       |      |        |      |       |       | 0    | 0    |      |      |      |
| Storage Lanes                                                     | 0     |       |      | 1     |       |      |        |      |       |       | 0    | 1    |      |      |      |
| Taper Length (ft)                                                 | 25    |       |      | 25    |       |      |        |      |       |       | 25   |      |      |      |      |
| Satd. Flow (prot)                                                 | 0     | 1664  | 0    | 1805  | 1710  | 0    | 1805   | 1900 | 1841  | 0     | 1611 | 0    |      |      |      |
| Flt Permitted                                                     |       | 0.970 |      | 0.729 |       |      | 0.089  |      |       |       |      |      |      |      |      |
| Satd. Flow (perm)                                                 | 0     | 1624  | 0    | 1385  | 1710  | 0    | 169    | 1900 | 1841  | 0     | 1611 | 0    |      |      |      |
| Right Turn on Red                                                 |       |       | Yes  |       | Yes   |      |        |      |       |       |      |      |      |      |      |
| Satd. Flow (RTOR)                                                 |       | 192   |      |       | 192   |      |        |      |       |       |      |      |      |      |      |
| Link Speed (mph)                                                  |       | 30    |      |       | 30    |      |        | 30   | 30    |       | 30   |      |      |      |      |
| Link Distance (ft)                                                |       | 401   |      |       | 460   |      |        | 252  | 508   |       | 187  |      |      |      |      |
| Travel Time (s)                                                   |       | 9.1   |      |       | 10.5  |      |        | 5.7  | 11.5  |       | 4.3  |      |      |      |      |
| Confl. Peds. (#/hr)                                               |       |       |      |       |       |      | 14     |      |       | 14    |      |      |      |      |      |
| Confl. Bikes (#/hr)                                               |       |       |      |       |       |      |        |      |       |       |      |      |      |      |      |
| Peak Hour Factor                                                  | 0.92  | 0.92  | 0.92 | 0.92  | 0.92  | 0.92 | 0.92   | 0.92 | 0.92  | 0.92  | 0.92 | 0.92 |      |      |      |
| Heavy Vehicles (%)                                                | 0%    | 0%    | 0%   | 0%    | 0%    | 0%   | 0%     | 0%   | 1%    | 1%    | 2%   | 2%   |      |      |      |
| Shared Lane Traffic (%)                                           |       |       |      |       |       |      |        |      |       |       |      |      |      |      |      |
| Lane Group Flow (vph)                                             | 0     | 43    | 0    | 168   | 33    | 0    | 168    | 1114 | 1201  | 0     | 1    | 0    |      |      |      |
| Turn Type                                                         | Perm  | NA    |      | Perm  | NA    |      | custom | NA   | NA    |       | Prot |      |      |      |      |
| Protected Phases                                                  |       | 5     |      |       | 5     |      | 1      | 1    | 2     | 3     | 6    |      | 2    | 3    | 4    |
| Permitted Phases                                                  |       | 5     |      | 5     |       |      | 2      |      |       |       |      |      |      |      |      |
| Detector Phase                                                    |       | 5     | 5    | 5     | 5     |      | 1      | 1    | 2     | 3     | 6    |      |      |      |      |
| Switch Phase                                                      |       |       |      |       |       |      |        |      |       |       |      |      |      |      |      |
| Minimum Initial (s)                                               | 4.0   | 4.0   |      | 4.0   | 4.0   |      | 4.0    |      |       |       | 4.0  |      | 10.0 | 10.0 | 4.0  |
| Minimum Split (s)                                                 | 11.0  | 11.0  |      | 11.0  | 11.0  |      | 10.0   |      |       |       | 9.0  |      | 25.0 | 27.0 | 10.0 |
| Total Split (s)                                                   | 27.0  | 27.0  |      | 27.0  | 27.0  |      | 23.0   |      |       |       | 9.0  |      | 51.0 | 28.0 | 10.0 |
| Total Split (%)                                                   | 18.2% | 18.2% |      | 18.2% | 18.2% |      | 15.5%  |      |       |       | 6.1% |      | 34%  | 19%  | 7%   |
| Yellow Time (s)                                                   | 3.0   | 3.0   |      | 3.0   | 3.0   |      | 4.0    |      |       |       | 3.0  |      | 4.0  | 4.0  | 4.0  |
| All-Red Time (s)                                                  | 4.0   | 4.0   |      | 4.0   | 4.0   |      | 2.0    |      |       |       | 2.0  |      | 2.0  | 2.0  | 2.0  |
| Lost Time Adjust (s)                                              |       | 0.0   |      | 0.0   | 0.0   |      | 0.0    |      |       |       | 0.0  |      |      |      |      |
| Total Lost Time (s)                                               |       | 7.0   |      | 7.0   | 7.0   |      | 6.0    |      |       |       | 5.0  |      |      |      |      |
| Lead/Lag                                                          | Lead  | Lead  |      | Lead  | Lead  |      | Lead   |      |       |       | Lag  |      | Lag  | Lead | Lag  |
| Lead-Lag Optimize?                                                |       |       |      |       |       |      |        |      |       |       |      |      |      |      |      |
| Recall Mode                                                       | None  | None  |      | None  | None  |      | None   |      |       |       | None |      | None | None | None |
| Act Effct Green (s)                                               | 19.3  | 19.3  |      | 19.3  | 19.3  |      | 62.0   |      | 106.0 | 73.0  | 4.0  |      |      |      |      |
| Actuated g/C Ratio                                                | 0.13  | 0.13  |      | 0.13  | 0.13  |      | 0.42   |      | 0.72  | 0.50  | 0.03 |      |      |      |      |
| v/c Ratio                                                         | 0.11  | 0.93  |      | 0.08  | 0.65  |      | 0.81   |      | 1.32  | 0.02  |      |      |      |      |      |
| Control Delay                                                     | 0.6   | 112.6 |      | 0.4   | 56.5  |      | 9.5    |      | 182.5 | 71.0  |      |      |      |      |      |
| Queue Delay                                                       | 0.1   | 53.1  |      | 0.0   | 7.7   |      | 38.0   |      | 1.0   | 0.0   |      |      |      |      |      |
| Total Delay                                                       | 0.7   | 165.7 |      | 0.4   | 64.2  |      | 47.5   |      | 183.5 | 71.0  |      |      |      |      |      |
| LOS                                                               | A     | F     |      | A     | E     |      | D      |      | F     | E     |      |      |      |      |      |
| Approach Delay                                                    | 0.7   |       |      | 138.6 |       |      | 49.7   |      | 183.5 | 71.0  |      |      |      |      |      |
| Approach LOS                                                      | A     |       |      | F     |       |      | D      |      | F     | E     |      |      |      |      |      |
| Queue Length 50th (ft)                                            | 0     |       |      | 162   | 0     |      | 124    |      | 103   | ~1494 | 1    |      |      |      |      |
| Queue Length 95th (ft)                                            | 0     |       |      | #305  | 0     |      | m107   |      | m68   | #1761 | 8    |      |      |      |      |
| Internal Link Dist (ft)                                           | 321   |       |      | 380   |       |      | 172    |      | 428   | 107   |      |      |      |      |      |
| Turn Bay Length (ft)                                              |       |       |      | 100   |       |      |        |      |       |       |      |      |      |      |      |
| Base Capacity (vph)                                               | 386   |       |      | 188   | 398   |      | 259    |      | 1367  | 912   | 43   |      |      |      |      |
| Starvation Cap Reductn                                            | 0     |       |      | 0     | 0     |      | 57     |      | 330   | 153   | 0    |      |      |      |      |
| Spillback Cap Reductn                                             | 66    |       |      | 41    | 0     |      | 0      |      | 0     | 11    | 0    |      |      |      |      |
| Storage Cap Reductn                                               | 0     |       |      | 0     | 0     |      | 0      |      | 0     | 0     | 0    |      |      |      |      |
| Reduced v/c Ratio                                                 | 0.13  |       |      | 1.14  | 0.08  |      | 0.83   |      | 1.07  | 1.58  | 0.02 |      |      |      |      |
| Intersection Summary                                              |       |       |      |       |       |      |        |      |       |       |      |      |      |      |      |
| Area Type: Other                                                  |       |       |      |       |       |      |        |      |       |       |      |      |      |      |      |
| Cycle Length: 148                                                 |       |       |      |       |       |      |        |      |       |       |      |      |      |      |      |
| Actuated Cycle Length: 147.3                                      |       |       |      |       |       |      |        |      |       |       |      |      |      |      |      |
| Natural Cycle: 145                                                |       |       |      |       |       |      |        |      |       |       |      |      |      |      |      |
| Control Type: Actuated-Uncoordinated                              |       |       |      |       |       |      |        |      |       |       |      |      |      |      |      |
| Maximum v/c Ratio: 1.32                                           |       |       |      |       |       |      |        |      |       |       |      |      |      |      |      |
| Intersection Signal Delay: 114.4                                  |       |       |      |       |       |      |        |      |       |       |      |      |      |      |      |
| Intersection Capacity Utilization 106.4%                          |       |       |      |       |       |      |        |      |       |       |      |      |      |      |      |
| Analysis Period (min) 15                                          |       |       |      |       |       |      |        |      |       |       |      |      |      |      |      |
| Volume exceeds capacity, queue is theoretically infinite.         |       |       |      |       |       |      |        |      |       |       |      |      |      |      |      |
| Queue shown is maximum after two cycles.                          |       |       |      |       |       |      |        |      |       |       |      |      |      |      |      |
| # 95th percentile volume exceeds capacity, queue may be longer.   |       |       |      |       |       |      |        |      |       |       |      |      |      |      |      |
| Queue shown is maximum after two cycles.                          |       |       |      |       |       |      |        |      |       |       |      |      |      |      |      |
| m Volume for 95th percentile queue is metered by upstream signal. |       |       |      |       |       |      |        |      |       |       |      |      |      |      |      |

12239.00 :: Needham Street  
16: Winchester Street/Centre Street & Route 9 WB Access Road & Driveway  
2025 Build Conditions with Shuttle Service  
Timing Plan: Weekday Evening

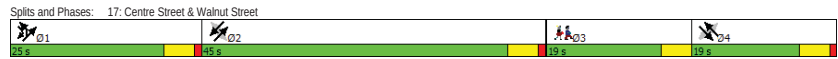


12239.00 :: Needham Street  
17: Centre Street & Walnut Street  
2025 Build Conditions with Shuttle Service  
Timing Plan: Weekday Evening

| Lane Group                                                      | SEL                    | SET   | SER   | NWL   | NWT   | NWR  | NEL                 | NET  | NER   | SWL   | SWT   | SWR  | Ø3 |
|-----------------------------------------------------------------|------------------------|-------|-------|-------|-------|------|---------------------|------|-------|-------|-------|------|----|
| Lane Configurations                                             |                        | ↰     | ↰     |       | ↱     | ↱    |                     | ↱    | ↱     | ↰     | ↰     | ↰    |    |
| Traffic Volume (vph)                                            | 30                     | 2     | 445   | 15    | 50    | 0    | 430                 | 610  | 10    | 2     | 645   | 60   |    |
| Future Volume (vph)                                             | 30                     | 2     | 445   | 15    | 50    | 0    | 430                 | 610  | 10    | 2     | 645   | 60   |    |
| Ideal Flow (vphpl)                                              | 1900                   | 1900  | 1900  | 1900  | 1900  | 1900 | 1900                | 1900 | 1900  | 1900  | 1900  | 1900 |    |
| Storage Length (ft)                                             | 0                      |       | 50    | 0     |       | 0    | 75                  |      | 0     | 0     | 0     | 0    |    |
| Storage Lanes                                                   | 0                      |       | 1     | 0     |       | 0    | 1                   |      | 0     | 0     | 0     | 0    |    |
| Taper Length (ft)                                               | 25                     |       |       | 25    |       |      | 25                  |      |       | 25    |       |      |    |
| Satd. Flow (prot)                                               | 0                      | 1814  | 1615  | 0     | 1879  | 0    | 1787                | 1877 | 0     | 0     | 1857  | 0    |    |
| Flt Permitted                                                   |                        | 0.740 |       |       | 0.919 |      | 0.208               |      |       |       | 0.999 |      |    |
| Satd. Flow (perm)                                               | 0                      | 1360  | 1558  | 0     | 1731  | 0    | 391                 | 1877 | 0     | 0     | 1855  | 0    |    |
| Right Turn on Red                                               |                        |       | No    |       |       | No   |                     |      | Yes   |       |       | Yes  |    |
| Satd. Flow (RTOR)                                               |                        |       |       |       |       |      |                     | 1    |       |       | 5     |      |    |
| Link Speed (mph)                                                |                        | 30    |       |       | 30    |      |                     | 30   |       |       | 30    |      |    |
| Link Distance (ft)                                              |                        | 624   |       |       | 387   |      |                     | 508  |       |       | 531   |      |    |
| Travel Time (s)                                                 |                        | 14.2  |       |       | 8.8   |      |                     | 11.5 |       |       | 12.1  |      |    |
| Confl. Peds. (#/hr)                                             | 11                     |       | 10    | 10    |       | 11   | 4                   |      | 8     | 8     |       | 4    |    |
| Peak Hour Factor                                                | 0.92                   | 0.92  | 0.92  | 0.92  | 0.92  | 0.92 | 0.92                | 0.92 | 0.92  | 0.92  | 0.92  | 0.92 |    |
| Heavy Vehicles (%)                                              | 0%                     | 0%    | 0%    | 0%    | 0%    | 0%   | 1%                  | 1%   | 1%    | 1%    | 1%    | 1%   |    |
| Shared Lane Traffic (%)                                         |                        |       |       |       |       |      |                     |      |       |       |       |      |    |
| Lane Group Flow (vph)                                           | 0                      | 35    | 484   | 0     | 70    | 0    | 467                 | 674  | 0     | 0     | 768   | 0    |    |
| Turn Type                                                       | Perm                   | NA    | pm+ov | Perm  | NA    |      | D,P+P               | NA   |       | Perm  | NA    |      |    |
| Protected Phases                                                |                        | 4     | 1     |       | 4     |      | 1                   | 12   |       |       | 2     | 3    |    |
| Permitted Phases                                                | 4                      |       | 4     | 4     |       |      | 2                   |      |       | 2     |       |      |    |
| Detector Phase                                                  | 4                      | 4     | 1     | 4     | 4     |      | 1                   | 12   |       | 2     | 2     |      |    |
| Switch Phase                                                    |                        |       |       |       |       |      |                     |      |       |       |       |      |    |
| Minimum Initial (s)                                             | 9.0                    | 9.0   | 7.0   | 9.0   | 9.0   |      | 7.0                 |      | 6.0   | 6.0   |       | 4.0  |    |
| Minimum Split (s)                                               | 14.0                   | 14.0  | 12.0  | 14.0  | 14.0  |      | 12.0                |      | 11.0  | 11.0  |       | 19.0 |    |
| Total Split (s)                                                 | 19.0                   | 19.0  | 25.0  | 19.0  | 19.0  |      | 25.0                |      | 45.0  | 45.0  |       | 19.0 |    |
| Total Split (%)                                                 | 17.6%                  | 17.6% | 23.1% | 17.6% | 17.6% |      | 23.1%               |      | 41.7% | 41.7% |       | 18%  |    |
| Yellow Time (s)                                                 | 4.0                    | 4.0   | 4.0   | 4.0   | 4.0   |      | 4.0                 |      | 4.0   | 4.0   |       | 4.0  |    |
| All-Red Time (s)                                                | 1.0                    | 1.0   | 1.0   | 1.0   | 1.0   |      | 1.0                 |      | 1.0   | 1.0   |       | 0.0  |    |
| Lost Time Adjust (s)                                            | 0.0                    | 0.0   | 0.0   | 0.0   | 0.0   |      | 0.0                 |      | 0.0   | 0.0   |       | 0.0  |    |
| Total Lost Time (s)                                             | 5.0                    | 5.0   |       | 5.0   | 5.0   |      | 5.0                 |      |       | 5.0   |       |      |    |
| Lead/Lag                                                        | Lag                    | Lag   | Lead  | Lag   | Lag   |      | Lead                |      |       | Lag   | Lag   | Lead |    |
| Lead-Lag Optimize?                                              |                        |       |       |       |       |      |                     |      |       |       |       |      |    |
| Recall Mode                                                     | Min                    | Min   | Max   | Min   | Min   |      | Max                 |      |       | Max   | Max   | None |    |
| Act Effct Green (s)                                             | 9.9                    | 30.1  |       | 9.9   | 60.7  |      | 65.8                |      |       |       | 40.5  |      |    |
| Actuated g/C Ratio                                              | 0.10                   | 0.31  |       | 0.10  | 0.63  |      | 0.68                |      |       |       | 0.42  |      |    |
| v/c Ratio                                                       | 0.25                   | 0.97  |       | 0.40  | 0.87  |      | 0.53                |      |       |       | 0.98  |      |    |
| Control Delay                                                   | 47.6                   | 67.7  |       | 50.1  | 36.0  |      | 11.3                |      |       |       | 58.7  |      |    |
| Queue Delay                                                     | 0.0                    | 0.0   |       | 0.0   | 0.0   |      | 1.1                 |      |       |       | 0.0   |      |    |
| Total Delay                                                     | 47.6                   | 67.7  |       | 50.1  | 36.0  |      | 12.4                |      |       |       | 58.7  |      |    |
| LOS                                                             | D                      | E     |       | D     | D     |      | B                   |      |       |       | E     |      |    |
| Approach Delay                                                  | 66.3                   |       |       | 50.1  |       |      | 22.0                |      |       |       | 58.7  |      |    |
| Approach LOS                                                    | E                      |       |       | D     |       |      | C                   |      |       |       | E     |      |    |
| Queue Length 50th (ft)                                          | 22                     | ~335  |       | 45    | 191   |      | 234                 |      |       |       | ~558  |      |    |
| Queue Length 95th (ft)                                          | 54                     | #546  |       | 89    | #414  |      | 365                 |      |       |       | #628  |      |    |
| Internal Link Dist (ft)                                         | 544                    |       |       | 307   |       |      | 428                 |      |       |       | 451   |      |    |
| Turn Bay Length (ft)                                            |                        | 50    |       |       | 75    |      |                     |      |       |       |       |      |    |
| Base Capacity (vph)                                             | 200                    | 499   |       | 254   | 539   |      | 1282                |      |       |       | 782   |      |    |
| Starvation Cap Reductn                                          | 0                      | 0     |       | 0     | 0     |      | 354                 |      |       |       | 0     |      |    |
| Spillback Cap Reductn                                           | 0                      | 0     |       | 0     | 0     |      | 0                   |      |       |       | 0     |      |    |
| Storage Cap Reductn                                             | 0                      | 0     |       | 0     | 0     |      | 0                   |      |       |       | 0     |      |    |
| Reduced v/c Ratio                                               | 0.17                   | 0.97  |       | 0.28  | 0.87  |      | 0.73                |      |       |       | 0.98  |      |    |
| Intersection Summary                                            |                        |       |       |       |       |      |                     |      |       |       |       |      |    |
| Area Type:                                                      | Other                  |       |       |       |       |      |                     |      |       |       |       |      |    |
| Cycle Length: 108                                               |                        |       |       |       |       |      |                     |      |       |       |       |      |    |
| Actuated Cycle Length: 96.3                                     |                        |       |       |       |       |      |                     |      |       |       |       |      |    |
| Natural Cycle: 110                                              |                        |       |       |       |       |      |                     |      |       |       |       |      |    |
| Control Type: Semi Act-Uncooord                                 |                        |       |       |       |       |      |                     |      |       |       |       |      |    |
| Maximum v/c Ratio: 0.98                                         |                        |       |       |       |       |      |                     |      |       |       |       |      |    |
| Intersection Signal Delay: 43.3                                 |                        |       |       |       |       |      | Intersection LOS: D |      |       |       |       |      |    |
| Intersection Capacity Utilization 93.1%                         | ICU Level of Service F |       |       |       |       |      |                     |      |       |       |       |      |    |
| Analysis Period (min) 15                                        |                        |       |       |       |       |      |                     |      |       |       |       |      |    |
| ~ Volume exceeds capacity, queue is theoretically infinite.     |                        |       |       |       |       |      |                     |      |       |       |       |      |    |
| Queue shown is maximum after two cycles.                        |                        |       |       |       |       |      |                     |      |       |       |       |      |    |
| # 95th percentile volume exceeds capacity, queue may be longer. |                        |       |       |       |       |      |                     |      |       |       |       |      |    |
| Queue shown is maximum after two cycles.                        |                        |       |       |       |       |      |                     |      |       |       |       |      |    |

12239.00 :: Needham Street  
17: Centre Street & Walnut Street

2025 Build Conditions with Shuttle Service  
Timing Plan: Weekday Evening

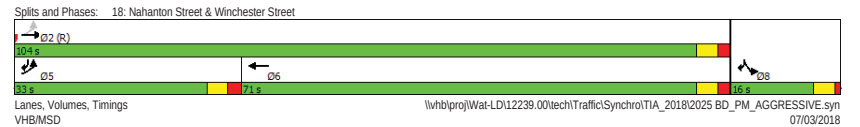


12239.00 :: Needham Street  
18: Nahanton Street & Winchester Street

2025 Build Conditions with Shuttle Service  
Timing Plan: Weekday Evening

|                         |  |  |  |  |  |  |
|-------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
| Lane Group              | EBL                                                                                 | EBT                                                                                 | WBT                                                                                 | WBR                                                                                 | SBL                                                                                 | SBR                                                                                 |
| Lane Configurations     |  |  |  |                                                                                     |  |  |
| Traffic Volume (vph)    | 400                                                                                 | 645                                                                                 | 470                                                                                 | 50                                                                                  | 80                                                                                  | 350                                                                                 |
| Future Volume (vph)     | 400                                                                                 | 645                                                                                 | 470                                                                                 | 50                                                                                  | 80                                                                                  | 350                                                                                 |
| Ideal Flow (vphpl)      | 1900                                                                                | 1900                                                                                | 1900                                                                                | 1900                                                                                | 1900                                                                                | 1900                                                                                |
| Storage Length (ft)     | 175                                                                                 |                                                                                     |                                                                                     | 0                                                                                   | 75                                                                                  | 0                                                                                   |
| Storage Lanes           | 1                                                                                   |                                                                                     |                                                                                     | 0                                                                                   | 1                                                                                   | 1                                                                                   |
| Taper Length (ft)       | 25                                                                                  |                                                                                     |                                                                                     |                                                                                     | 25                                                                                  |                                                                                     |
| Satd. Flow (prot)       | 1805                                                                                | 1900                                                                                | 1875                                                                                | 0                                                                                   | 1805                                                                                | 1615                                                                                |
| Flt Permitted           | 0.288                                                                               |                                                                                     |                                                                                     |                                                                                     | 0.950                                                                               |                                                                                     |
| Satd. Flow (perm)       | 547                                                                                 | 1900                                                                                | 1875                                                                                | 0                                                                                   | 1805                                                                                | 1615                                                                                |
| Right Turn on Red       |                                                                                     |                                                                                     |                                                                                     | Yes                                                                                 |                                                                                     | No                                                                                  |
| Satd. Flow (RTOR)       |                                                                                     |                                                                                     | 7                                                                                   |                                                                                     |                                                                                     |                                                                                     |
| Link Speed (mph)        |                                                                                     | 30                                                                                  | 30                                                                                  |                                                                                     | 30                                                                                  |                                                                                     |
| Link Distance (ft)      |                                                                                     | 963                                                                                 | 734                                                                                 |                                                                                     | 889                                                                                 |                                                                                     |
| Travel Time (s)         |                                                                                     | 21.9                                                                                | 16.7                                                                                |                                                                                     | 20.2                                                                                |                                                                                     |
| Peak Hour Factor        | 0.92                                                                                | 0.92                                                                                | 0.92                                                                                | 0.92                                                                                | 0.92                                                                                | 0.92                                                                                |
| Heavy Vehicles (%)      | 0%                                                                                  | 0%                                                                                  | 0%                                                                                  | 0%                                                                                  | 0%                                                                                  | 0%                                                                                  |
| Shared Lane Traffic (%) |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Lane Group Flow (vph)   | 435                                                                                 | 701                                                                                 | 565                                                                                 | 0                                                                                   | 87                                                                                  | 380                                                                                 |
| Turn Type               | pm+pt                                                                               | NA                                                                                  | NA                                                                                  |                                                                                     | Prot                                                                                | pt+ov                                                                               |
| Protected Phases        | 5                                                                                   | 2                                                                                   | 6                                                                                   |                                                                                     | 8                                                                                   | 5 8                                                                                 |
| Permitted Phases        | 2                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Detector Phase          | 5                                                                                   | 2                                                                                   | 6                                                                                   |                                                                                     | 8                                                                                   | 5 8                                                                                 |
| Switch Phase            |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Minimum Initial (s)     | 6.0                                                                                 | 10.0                                                                                | 10.0                                                                                |                                                                                     | 6.0                                                                                 |                                                                                     |
| Minimum Split (s)       | 11.0                                                                                | 15.0                                                                                | 23.0                                                                                |                                                                                     | 10.0                                                                                |                                                                                     |
| Total Split (s)         | 33.0                                                                                | 104.0                                                                               | 71.0                                                                                |                                                                                     | 16.0                                                                                |                                                                                     |
| Total Split (%)         | 27.5%                                                                               | 86.7%                                                                               | 59.2%                                                                               |                                                                                     | 13.3%                                                                               |                                                                                     |
| Yellow Time (s)         | 3.0                                                                                 | 3.0                                                                                 | 3.0                                                                                 |                                                                                     | 3.0                                                                                 |                                                                                     |
| All-Red Time (s)        | 2.0                                                                                 | 2.0                                                                                 | 2.0                                                                                 |                                                                                     | 1.0                                                                                 |                                                                                     |
| Lost Time Adjust (s)    | 0.0                                                                                 | 0.0                                                                                 | 0.0                                                                                 |                                                                                     | 0.0                                                                                 |                                                                                     |
| Total Lost Time (s)     | 5.0                                                                                 | 5.0                                                                                 | 5.0                                                                                 |                                                                                     | 4.0                                                                                 |                                                                                     |
| Lead/Lag                | Lead                                                                                |                                                                                     | Lag                                                                                 |                                                                                     |                                                                                     |                                                                                     |
| Lead-Lag Optimize?      | Yes                                                                                 |                                                                                     | Yes                                                                                 |                                                                                     |                                                                                     |                                                                                     |
| Recall Mode             | None                                                                                | C-Min                                                                               | None                                                                                |                                                                                     | None                                                                                |                                                                                     |
| Act Effct Green (s)     | 86.9                                                                                | 86.9                                                                                | 64.7                                                                                |                                                                                     | 24.1                                                                                | 45.3                                                                                |
| Actuated g/C Ratio      | 0.72                                                                                | 0.72                                                                                | 0.54                                                                                |                                                                                     | 0.20                                                                                | 0.38                                                                                |
| v/c Ratio               | 0.76                                                                                | 0.51                                                                                | 0.56                                                                                |                                                                                     | 0.24                                                                                | 0.62                                                                                |
| Control Delay           | 15.8                                                                                | 8.9                                                                                 | 21.7                                                                                |                                                                                     | 42.2                                                                                | 34.9                                                                                |
| Queue Delay             | 0.0                                                                                 | 0.0                                                                                 | 0.0                                                                                 |                                                                                     | 0.0                                                                                 | 0.0                                                                                 |
| Total Delay             | 15.8                                                                                | 8.9                                                                                 | 21.7                                                                                |                                                                                     | 42.2                                                                                | 34.9                                                                                |
| LOS                     | B                                                                                   | A                                                                                   | C                                                                                   |                                                                                     | D                                                                                   | C                                                                                   |
| Approach Delay          |                                                                                     | 11.6                                                                                | 21.7                                                                                |                                                                                     | 36.2                                                                                |                                                                                     |
| Approach LOS            |                                                                                     | B                                                                                   | C                                                                                   |                                                                                     | D                                                                                   |                                                                                     |
| Queue Length 50th (ft)  |                                                                                     | 117                                                                                 | 228                                                                                 |                                                                                     | 56                                                                                  | 227                                                                                 |
| Queue Length 95th (ft)  |                                                                                     | 142                                                                                 | 247                                                                                 |                                                                                     | 110                                                                                 | 338                                                                                 |
| Internal Link Dist (ft) |                                                                                     | 883                                                                                 | 654                                                                                 |                                                                                     | 809                                                                                 |                                                                                     |
| Turn Bay Length (ft)    |                                                                                     | 175                                                                                 |                                                                                     |                                                                                     | 75                                                                                  |                                                                                     |
| Base Capacity (vph)     |                                                                                     | 689                                                                                 | 1567                                                                                |                                                                                     | 362                                                                                 | 754                                                                                 |
| Starvation Cap Reductn  |                                                                                     | 0                                                                                   | 0                                                                                   |                                                                                     | 0                                                                                   | 0                                                                                   |
| Spillback Cap Reductn   |                                                                                     | 0                                                                                   | 0                                                                                   |                                                                                     | 0                                                                                   | 0                                                                                   |
| Storage Cap Reductn     |                                                                                     | 0                                                                                   | 0                                                                                   |                                                                                     | 0                                                                                   | 0                                                                                   |
| Reduced v/c Ratio       |                                                                                     | 0.63                                                                                | 0.45                                                                                |                                                                                     | 0.24                                                                                | 0.50                                                                                |

| Intersection Summary               |                                                    |
|------------------------------------|----------------------------------------------------|
| Area Type:                         | Other                                              |
| Cycle Length:                      | 120                                                |
| Actuated Cycle Length:             | 120                                                |
| Offset:                            | 8 (7%), Referenced to phase 2:EBTL, Start of Green |
| Natural Cycle:                     | 60                                                 |
| Control Type:                      | Actuated-Coordinated                               |
| Maximum v/c Ratio:                 | 0.76                                               |
| Intersection Signal Delay:         | 19.5                                               |
| Intersection Capacity Utilization: | 66.6%                                              |
| Analysis Period (min):             | 15                                                 |
| Intersection LOS:                  | B                                                  |
| ICU Level of Service:              | C                                                  |



12239.00 :: Needham Street  
19: Wells Avenue/JCC Driveway & Nahanton Street  
2025 Build Conditions with Shuttle Service  
Timing Plan: Weekday Evening

| Lane Group              | EBL                                                                               | EBT                                                                               | EBR                                                                               | WBL                                                                               | WBT                                                                               | WBR                                                                               | NBL                                                                               | NBT                                                                               | NBR                                                                               | SBL                                                                               | SBT                                                                               | SBR                                                                               |
|-------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|
| Lane Configurations     |  |  |  |  |  |  |  |  |  |  |  |  |
| Traffic Volume (vph)    | 45                                                                                | 530                                                                               | 125                                                                               | 170                                                                               | 590                                                                               | 60                                                                                | 510                                                                               | 20                                                                                | 400                                                                               | 115                                                                               | 2                                                                                 | 60                                                                                |
| Future Volume (vph)     | 45                                                                                | 530                                                                               | 125                                                                               | 170                                                                               | 590                                                                               | 60                                                                                | 510                                                                               | 20                                                                                | 400                                                                               | 115                                                                               | 2                                                                                 | 60                                                                                |
| Ideal Flow (vphpl)      | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                              |
| Storage Length (ft)     | 125                                                                               |                                                                                   | 125                                                                               | 150                                                                               |                                                                                   | 0                                                                                 | 0                                                                                 |                                                                                   | 0                                                                                 | 75                                                                                |                                                                                   | 0                                                                                 |
| Storage Lanes           | 1                                                                                 |                                                                                   | 1                                                                                 |                                                                                   |                                                                                   | 0                                                                                 | 1                                                                                 |                                                                                   | 0                                                                                 | 1                                                                                 |                                                                                   | 0                                                                                 |
| Taper Length (ft)       | 25                                                                                |                                                                                   |                                                                                   | 25                                                                                |                                                                                   |                                                                                   | 25                                                                                |                                                                                   |                                                                                   | 25                                                                                |                                                                                   |                                                                                   |
| Satd. Flow (prot)       | 1787                                                                              | 1881                                                                              | 1599                                                                              | 1805                                                                              | 1870                                                                              | 0                                                                                 | 1805                                                                              | 1628                                                                              | 0                                                                                 | 1805                                                                              | 1623                                                                              | 0                                                                                 |
| Flt Permitted           | 0.133                                                                             |                                                                                   |                                                                                   | 0.133                                                                             |                                                                                   |                                                                                   | 0.713                                                                             |                                                                                   |                                                                                   | 0.332                                                                             |                                                                                   |                                                                                   |
| Satd. Flow (perm)       | 250                                                                               | 1881                                                                              | 1565                                                                              | 253                                                                               | 1870                                                                              | 0                                                                                 | 1355                                                                              | 1628                                                                              | 0                                                                                 | 631                                                                               | 1623                                                                              | 0                                                                                 |
| Right Turn on Red       |                                                                                   |                                                                                   | Yes                                                                               |                                                                                   |                                                                                   | Yes                                                                               |                                                                                   |                                                                                   | Yes                                                                               |                                                                                   |                                                                                   | Yes                                                                               |
| Satd. Flow (RTOR)       |                                                                                   |                                                                                   | 80                                                                                |                                                                                   | 6                                                                                 |                                                                                   |                                                                                   | 347                                                                               |                                                                                   |                                                                                   | 65                                                                                |                                                                                   |
| Link Speed (mph)        |                                                                                   | 30                                                                                |                                                                                   |                                                                                   | 30                                                                                |                                                                                   |                                                                                   | 30                                                                                |                                                                                   |                                                                                   | 30                                                                                |                                                                                   |
| Link Distance (ft)      |                                                                                   | 797                                                                               |                                                                                   |                                                                                   | 963                                                                               |                                                                                   |                                                                                   | 598                                                                               |                                                                                   |                                                                                   | 628                                                                               |                                                                                   |
| Travel Time (s)         |                                                                                   | 18.1                                                                              |                                                                                   |                                                                                   | 21.9                                                                              |                                                                                   |                                                                                   | 13.6                                                                              |                                                                                   |                                                                                   | 14.3                                                                              |                                                                                   |
| Confl. Peds. (#/hr)     | 1                                                                                 |                                                                                   | 1                                                                                 | 1                                                                                 |                                                                                   | 1                                                                                 |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| Peak Hour Factor        | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              |
| Heavy Vehicles (%)      | 1%                                                                                | 1%                                                                                | 1%                                                                                | 0%                                                                                | 0%                                                                                | 0%                                                                                | 0%                                                                                | 0%                                                                                | 0%                                                                                | 0%                                                                                | 0%                                                                                | 0%                                                                                |
| Shared Lane Traffic (%) |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| Lane Group Flow (vph)   | 49                                                                                | 576                                                                               | 136                                                                               | 185                                                                               | 706                                                                               | 0                                                                                 | 554                                                                               | 457                                                                               | 0                                                                                 | 125                                                                               | 67                                                                                | 0                                                                                 |
| Turn Type               | pm+pt                                                                             | NA                                                                                | Perm                                                                              | pm+pt                                                                             | NA                                                                                |                                                                                   | Perm                                                                              | NA                                                                                |                                                                                   | Perm                                                                              | NA                                                                                |                                                                                   |
| Protected Phases        | 3                                                                                 | 1                                                                                 |                                                                                   | 3                                                                                 | 1                                                                                 |                                                                                   |                                                                                   | 2                                                                                 |                                                                                   |                                                                                   | 2                                                                                 |                                                                                   |
| Permitted Phases        | 1                                                                                 |                                                                                   | 1                                                                                 | 1                                                                                 |                                                                                   |                                                                                   | 2                                                                                 |                                                                                   |                                                                                   | 2                                                                                 |                                                                                   |                                                                                   |
| Detector Phase          | 3                                                                                 | 1                                                                                 | 1                                                                                 | 3                                                                                 | 1                                                                                 |                                                                                   | 2                                                                                 | 2                                                                                 |                                                                                   | 2                                                                                 | 2                                                                                 |                                                                                   |
| Switch Phase            |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| Minimum Initial (s)     | 6.0                                                                               | 6.0                                                                               | 6.0                                                                               | 6.0                                                                               | 6.0                                                                               |                                                                                   | 6.0                                                                               | 6.0                                                                               |                                                                                   | 6.0                                                                               | 6.0                                                                               |                                                                                   |
| Minimum Split (s)       | 10.0                                                                              | 11.0                                                                              | 11.0                                                                              | 10.0                                                                              | 11.0                                                                              |                                                                                   | 11.0                                                                              | 11.0                                                                              |                                                                                   | 11.0                                                                              | 11.0                                                                              |                                                                                   |
| Total Split (s)         | 14.0                                                                              | 35.0                                                                              | 35.0                                                                              | 14.0                                                                              | 35.0                                                                              |                                                                                   | 45.0                                                                              | 45.0                                                                              |                                                                                   | 45.0                                                                              | 45.0                                                                              |                                                                                   |
| Total Split (%)         | 14.9%                                                                             | 37.2%                                                                             | 37.2%                                                                             | 14.9%                                                                             | 37.2%                                                                             |                                                                                   | 47.9%                                                                             | 47.9%                                                                             |                                                                                   | 47.9%                                                                             | 47.9%                                                                             |                                                                                   |
| Yellow Time (s)         | 3.0                                                                               | 3.0                                                                               | 3.0                                                                               | 3.0                                                                               | 3.0                                                                               |                                                                                   | 3.0                                                                               | 3.0                                                                               |                                                                                   | 3.0                                                                               | 3.0                                                                               |                                                                                   |
| All-Red Time (s)        | 1.0                                                                               | 2.0                                                                               | 2.0                                                                               | 1.0                                                                               | 2.0                                                                               |                                                                                   | 2.0                                                                               | 2.0                                                                               |                                                                                   | 2.0                                                                               | 2.0                                                                               |                                                                                   |
| Last Time Adjust (s)    | 0.0                                                                               | 0.0                                                                               | 0.0                                                                               | 0.0                                                                               | 0.0                                                                               |                                                                                   | 0.0                                                                               | 0.0                                                                               |                                                                                   | 0.0                                                                               | 0.0                                                                               |                                                                                   |
| Total Lost Time (s)     | 4.0                                                                               | 5.0                                                                               | 5.0                                                                               | 4.0                                                                               | 5.0                                                                               |                                                                                   | 5.0                                                                               | 5.0                                                                               |                                                                                   | 5.0                                                                               | 5.0                                                                               |                                                                                   |
| Lead/Lag                |                                                                                   | Lead                                                                              | Lead                                                                              |                                                                                   | Lead                                                                              |                                                                                   | Lag                                                                               | Lag                                                                               |                                                                                   | Lag                                                                               | Lag                                                                               |                                                                                   |
| Lead-Lag Optimize?      |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| Recall Mode             | None                                                                              | None                                                                              | None                                                                              | None                                                                              | None                                                                              |                                                                                   | None                                                                              | None                                                                              |                                                                                   | None                                                                              | None                                                                              |                                                                                   |
| Act Effct Green (s)     | 40.1                                                                              | 30.0                                                                              | 30.0                                                                              | 40.1                                                                              | 30.0                                                                              |                                                                                   | 38.9                                                                              | 38.9                                                                              |                                                                                   | 38.9                                                                              | 38.9                                                                              |                                                                                   |
| Actuated g/C Ratio      | 0.44                                                                              | 0.33                                                                              | 0.33                                                                              | 0.44                                                                              | 0.33                                                                              |                                                                                   | 0.42                                                                              | 0.42                                                                              |                                                                                   | 0.42                                                                              | 0.42                                                                              |                                                                                   |
| v/c Ratio               | 0.19                                                                              | 0.94                                                                              | 0.24                                                                              | 0.70                                                                              | 1.15                                                                              |                                                                                   | 0.97                                                                              | 0.51                                                                              |                                                                                   | 0.47                                                                              | 0.09                                                                              |                                                                                   |
| Control Delay           | 15.1                                                                              | 56.2                                                                              | 12.0                                                                              | 32.1                                                                              | 116.3                                                                             |                                                                                   | 58.5                                                                              | 7.1                                                                               |                                                                                   | 26.5                                                                              | 5.0                                                                               |                                                                                   |
| Queue Delay             | 0.0                                                                               | 0.0                                                                               | 0.0                                                                               | 0.0                                                                               | 0.0                                                                               |                                                                                   | 0.0                                                                               | 0.0                                                                               |                                                                                   | 0.0                                                                               | 0.0                                                                               |                                                                                   |
| Total Delay             | 15.1                                                                              | 56.2                                                                              | 12.0                                                                              | 32.1                                                                              | 116.3                                                                             |                                                                                   | 58.5                                                                              | 7.1                                                                               |                                                                                   | 26.5                                                                              | 5.0                                                                               |                                                                                   |
| LOS                     | B                                                                                 | E                                                                                 | B                                                                                 | C                                                                                 | F                                                                                 |                                                                                   | E                                                                                 | A                                                                                 |                                                                                   | C                                                                                 | A                                                                                 |                                                                                   |
| Approach Delay          |                                                                                   | 45.6                                                                              |                                                                                   |                                                                                   | 98.8                                                                              |                                                                                   |                                                                                   | 35.3                                                                              |                                                                                   |                                                                                   | 19.0                                                                              |                                                                                   |
| Approach LOS            |                                                                                   | D                                                                                 |                                                                                   |                                                                                   | F                                                                                 |                                                                                   |                                                                                   | D                                                                                 |                                                                                   |                                                                                   | B                                                                                 |                                                                                   |
| Queue Length 50th (ft)  | 15                                                                                | 335                                                                               | 23                                                                                | 61                                                                                | ~507                                                                              |                                                                                   | 313                                                                               | 39                                                                                |                                                                                   | 52                                                                                | 1                                                                                 |                                                                                   |
| Queue Length 95th (ft)  | 34                                                                                | #548                                                                              | 67                                                                                | #138                                                                              | #727                                                                              |                                                                                   | #534                                                                              | 116                                                                               |                                                                                   | 109                                                                               | 24                                                                                |                                                                                   |
| Internal Link Dist (ft) |                                                                                   | 717                                                                               |                                                                                   |                                                                                   | 883                                                                               |                                                                                   |                                                                                   | 518                                                                               |                                                                                   |                                                                                   | 548                                                                               |                                                                                   |
| Turn Bay Length (ft)    | 125                                                                               |                                                                                   | 125                                                                               | 150                                                                               |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   | 75                                                                                |                                                                                   |                                                                                   |
| Base Capacity (vph)     | 278                                                                               | 614                                                                               | 564                                                                               | 281                                                                               | 614                                                                               |                                                                                   | 589                                                                               | 904                                                                               |                                                                                   | 274                                                                               | 742                                                                               |                                                                                   |
| Starvation Cap Reductn  | 0                                                                                 | 0                                                                                 | 0                                                                                 | 0                                                                                 | 0                                                                                 |                                                                                   | 0                                                                                 | 0                                                                                 |                                                                                   | 0                                                                                 | 0                                                                                 |                                                                                   |
| Spillback Cap Reductn   | 0                                                                                 | 0                                                                                 | 0                                                                                 | 0                                                                                 | 0                                                                                 |                                                                                   | 0                                                                                 | 0                                                                                 |                                                                                   | 0                                                                                 | 0                                                                                 |                                                                                   |
| Storage Cap Reductn     | 0                                                                                 | 0                                                                                 | 0                                                                                 | 0                                                                                 | 0                                                                                 |                                                                                   | 0                                                                                 | 0                                                                                 |                                                                                   | 0                                                                                 | 0                                                                                 |                                                                                   |
| Reduced v/c Ratio       | 0.18                                                                              | 0.94                                                                              | 0.24                                                                              | 0.66                                                                              | 1.15                                                                              |                                                                                   | 0.94                                                                              | 0.51                                                                              |                                                                                   | 0.46                                                                              | 0.09                                                                              |                                                                                   |

| Intersection Summary                                            |                        |
|-----------------------------------------------------------------|------------------------|
| Area Type:                                                      | Other                  |
| Cycle Length:                                                   | 94                     |
| Actuated Cycle Length:                                          | 92                     |
| Natural Cycle:                                                  | 90                     |
| Control Type:                                                   | Actuated-Uncoordinated |
| Maximum v/c Ratio:                                              | 1.15                   |
| Intersection Signal Delay:                                      | 56.8                   |
| Intersection Capacity Utilization:                              | 88.8%                  |
| Analysis Period (min):                                          | 15                     |
| - Volume exceeds capacity, queue is theoretically infinite.     |                        |
| - Queue shown is maximum after two cycles.                      |                        |
| # 95th percentile volume exceeds capacity, queue may be longer. |                        |
| - Queue shown is maximum after two cycles.                      |                        |

12239.00 :: Needham Street  
19: Wells Avenue/JCC Driveway & Nahanton Street  
2025 Build Conditions with Shuttle Service  
Timing Plan: Weekday Evening



12239.00 :: Needham Street  
20: Highland Avenue & Riverside Street

2025 Build Conditions with Shuttle Service  
Timing Plan: Weekday Evening

| Intersection             |        |       |        |       |      |      |
|--------------------------|--------|-------|--------|-------|------|------|
| Int Delay, s/veh         | 0.3    |       |        |       |      |      |
| Movement                 | NWL    | NWR   | NET    | NER   | SWL  | SWT  |
| Lane Configurations      | ↔      |       | ↔↔     |       |      | ↔    |
| Traffic Vol, veh/h       | 5      | 5     | 950    | 5     | 1    | 1155 |
| Future Vol, veh/h        | 5      | 5     | 950    | 5     | 1    | 1155 |
| Conflicting Peds, #/hr   | 0      | 0     | 0      | 3     | 3    | 0    |
| Sign Control             | Stop   | Stop  | Free   | Free  | Free | Free |
| RT Channelized           | -      | None  | -      | None  | -    | None |
| Storage Length           | 0      | -     | -      | -     | -    | -    |
| Veh in Median Storage, # | 0      | -     | 0      | -     | -    | 0    |
| Grade, %                 | 0      | -     | 0      | -     | -    | 0    |
| Peak Hour Factor         | 92     | 92    | 92     | 92    | 92   | 92   |
| Heavy Vehicles, %        | 0      | 0     | 0      | 0     | 0    | 0    |
| Mvmt Flow                | 5      | 5     | 1033   | 5     | 1    | 1255 |
| Major/Minor              |        |       |        |       |      |      |
| Minor1                   | Major1 |       | Major2 |       |      |      |
| Conflicting Flow All     | 2296   | 522   | 0      | 0     | 1041 | 0    |
| Stage 1                  | 1038   | -     | -      | -     | -    | -    |
| Stage 2                  | 1258   | -     | -      | -     | -    | -    |
| Critical Hdwy            | 6.6    | 6.9   | -      | -     | 4.1  | -    |
| Critical Hdwy Stg 1      | 5.8    | -     | -      | -     | -    | -    |
| Critical Hdwy Stg 2      | 5.4    | -     | -      | -     | -    | -    |
| Follow-up Hdwy           | 3.5    | 3.3   | -      | -     | 2.2  | -    |
| Pot Cap-1 Maneuver       | 38     | 505   | -      | -     | 676  | -    |
| Stage 1                  | 307    | -     | -      | -     | -    | -    |
| Stage 2                  | 270    | -     | -      | -     | -    | -    |
| Platoon blocked, %       |        | -     | -      | -     | -    | -    |
| Mov Cap-1 Maneuver       | 38     | 504   | -      | -     | 676  | -    |
| Mov Cap-2 Maneuver       | 38     | -     | -      | -     | -    | -    |
| Stage 1                  | 306    | -     | -      | -     | -    | -    |
| Stage 2                  | 269    | -     | -      | -     | -    | -    |
| Approach                 |        |       |        |       |      |      |
| NW                       | NE     |       | SW     |       |      |      |
| HCM Control Delay, s     | 64.7   | 0     |        | 0     |      |      |
| HCM LOS                  | F      |       |        |       |      |      |
| Minor Lane/Major Mvmt    |        |       |        |       |      |      |
| NET                      | NER    | NWLn1 | SWL    | SWT   |      |      |
| Capacity (veh/h)         | -      | -     | 71     | 676   | -    | -    |
| HCM Lane V/C Ratio       | -      | -     | 0.153  | 0.002 | -    | -    |
| HCM Control Delay (s)    | -      | -     | 64.7   | 10.3  | 0    | -    |
| HCM Lane LOS             | -      | -     | F      | B     | A    | -    |
| HCM 95th %ile Q(veh)     | -      | -     | 0.5    | 0     | -    | -    |

12239.00 :: Needham Street  
21: Highland Avenue & Highland Terrace/Highland Circle

2025 Build Conditions with Shuttle Service  
Timing Plan: Weekday Evening

| Intersection             |        |      |       |        |       |       |        |      |      |      |      |      |
|--------------------------|--------|------|-------|--------|-------|-------|--------|------|------|------|------|------|
| Int Delay, s/veh         | 0.7    |      |       |        |       |       |        |      |      |      |      |      |
| Movement                 | SEL    | SET  | SER   | NWL    | NWT   | NWR   | NEL    | NET  | NER  | SWL  | SWT  | SWR  |
| Lane Configurations      |        | ↔    |       |        | ↔     |       |        | ↔↔   |      |      | ↔↔   |      |
| Traffic Vol, veh/h       | 5      | 0    | 15    | 5      | 0     | 2     | 10     | 950  | 2    | 5    | 1150 | 5    |
| Future Vol, veh/h        | 5      | 0    | 15    | 5      | 0     | 2     | 10     | 950  | 2    | 5    | 1150 | 5    |
| Conflicting Peds, #/hr   | 0      | 0    | 0     | 0      | 0     | 0     | 6      | 0    | 4    | 4    | 0    | 6    |
| Sign Control             | Stop   | Stop | Stop  | Stop   | Stop  | Stop  | Free   | Free | Free | Free | Free | Free |
| RT Channelized           | -      | -    | None  | -      | -     | None  | -      | -    | None | -    | -    | None |
| Storage Length           | -      | -    | -     | -      | -     | -     | -      | -    | -    | -    | -    | -    |
| Veh in Median Storage, # | -      | 0    | -     | -      | 0     | -     | -      | 0    | -    | -    | 0    | -    |
| Grade, %                 | -      | 0    | -     | -      | 0     | -     | -      | 0    | -    | -    | 0    | -    |
| Peak Hour Factor         | 92     | 92   | 92    | 92     | 92    | 92    | 92     | 92   | 92   | 92   | 92   | 92   |
| Heavy Vehicles, %        | 0      | 0    | 0     | 0      | 0     | 0     | 0      | 0    | 0    | 0    | 0    | 0    |
| Mvmt Flow                | 5      | 0    | 16    | 5      | 0     | 2     | 11     | 1033 | 2    | 5    | 1250 | 5    |
| Major/Minor              |        |      |       |        |       |       |        |      |      |      |      |      |
| Minor2                   | Minor1 |      |       | Major1 |       |       | Major2 |      |      |      |      |      |
| Conflicting Flow All     | 1808   | 2331 | 634   | 1695   | 2331  | 521   | 1261   | 0    | 0    | 1039 | 0    | 0    |
| Stage 1                  | 1270   | -    | -     | 1059   | 1059  | -     | -      | -    | -    | -    | -    | -    |
| Stage 2                  | 538    | 1061 | -     | 636    | 1272  | -     | -      | -    | -    | -    | -    | -    |
| Critical Hdwy            | 7.5    | 6.5  | 6.9   | 7.5    | 6.5   | 6.9   | 4.1    | -    | -    | 4.1  | -    | -    |
| Critical Hdwy Stg 1      | 6.5    | 5.5  | -     | 6.5    | 5.5   | -     | -      | -    | -    | -    | -    | -    |
| Critical Hdwy Stg 2      | 6.5    | 5.5  | -     | 6.5    | 5.5   | -     | -      | -    | -    | -    | -    | -    |
| Follow-up Hdwy           | 3.5    | 4    | 3.3   | 3.5    | 4     | 3.3   | 2.2    | -    | -    | 2.2  | -    | -    |
| Pot Cap-1 Maneuver       | 51     | 37   | 427   | 61     | 37    | 505   | 558    | -    | -    | 677  | -    | -    |
| Stage 1                  | 181    | 241  | -     | 243    | 304   | -     | -      | -    | -    | -    | -    | -    |
| Stage 2                  | 500    | 303  | -     | 437    | 241   | -     | -      | -    | -    | -    | -    | -    |
| Platoon blocked, %       |        |      |       |        |       |       | -      | -    | -    | -    | -    | -    |
| Mov Cap-1 Maneuver       | 48     | 34   | 425   | 55     | 34    | 503   | 558    | -    | -    | 677  | -    | -    |
| Mov Cap-2 Maneuver       | 48     | 34   | -     | 55     | 34    | -     | -      | -    | -    | -    | -    | -    |
| Stage 1                  | 172    | 234  | -     | 231    | 289   | -     | -      | -    | -    | -    | -    | -    |
| Stage 2                  | 475    | 288  | -     | 410    | 234   | -     | -      | -    | -    | -    | -    | -    |
| Approach                 |        |      |       |        |       |       |        |      |      |      |      |      |
| SE                       | NW     |      |       | NE     |       |       | SW     |      |      |      |      |      |
| HCM Control Delay, s     | 34.6   |      | 59.1  |        |       | 0.4   |        |      |      | 0.1  |      |      |
| HCM LOS                  | D      |      | F     |        |       |       |        |      |      |      |      |      |
| Minor Lane/Major Mvmt    |        |      |       |        |       |       |        |      |      |      |      |      |
| NEL                      | NET    | NER  | NWLn1 | SELn1  | SWL   | SWT   | SWR    |      |      |      |      |      |
| Capacity (veh/h)         | 558    | -    | -     | 74     | 143   | 677   | -      | -    | -    | -    | -    | -    |
| HCM Lane V/C Ratio       | 0.019  | -    | -     | 0.103  | 0.152 | 0.008 | -      | -    | -    | -    | -    | -    |
| HCM Control Delay (s)    | 11.6   | 0.3  | -     | 59.1   | 34.6  | 10.4  | 0.1    | -    | -    | -    | -    | -    |
| HCM Lane LOS             | B      | A    | -     | F      | D     | B     | A      | -    | -    | -    | -    | -    |
| HCM 95th %ile Q(veh)     | 0.1    | -    | -     | 0.3    | 0.5   | 0     | -      | -    | -    | -    | -    | -    |

12239.00 :: Needham Street  
22: 2nd Avenue/Staples Driveway & Highland Avenue

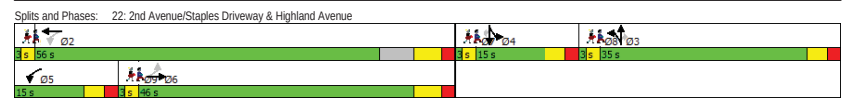
2025 Build Conditions with Shuttle Service  
Timing Plan: Weekday Evening

| Lane Group              | EBL   | EBT   | EBR  | WBL   | WBT   | WBR  | NBL   | NBT   | NBR   | SBL   | SBT   | SBR   | Ø1   | Ø7   | Ø8   | Ø9   |
|-------------------------|-------|-------|------|-------|-------|------|-------|-------|-------|-------|-------|-------|------|------|------|------|
| Lane Configurations     |       |       |      |       |       |      |       |       |       |       |       |       |      |      |      |      |
| Traffic Volume (vph)    | 10    | 705   | 125  | 175   | 945   | 45   | 345   | 20    | 190   | 60    | 20    | 25    |      |      |      |      |
| Future Volume (vph)     | 10    | 705   | 125  | 175   | 945   | 45   | 345   | 20    | 190   | 60    | 20    | 25    |      |      |      |      |
| Ideal Flow (vphpl)      | 1900  | 1900  | 1900 | 1900  | 1900  | 1900 | 1900  | 1900  | 1900  | 1900  | 1900  | 1900  |      |      |      |      |
| Storage Length (ft)     | 100   |       | 0    | 100   |       | 0    | 150   |       | 100   |       | 0     | 50    |      |      |      |      |
| Storage Lanes           | 1     |       | 0    | 0     |       | 0    | 1     |       | 1     |       | 0     | 1     |      |      |      |      |
| Taper Length (ft)       | 25    |       |      | 25    |       |      | 25    |       |       | 25    |       |       |      |      |      |      |
| Satd. Flow (prot)       | 1805  | 3514  | 0    | 0     | 3560  | 0    | 1715  | 1727  | 1615  | 0     | 1832  | 1615  |      |      |      |      |
| Flt Permitted           | 0.143 |       |      |       | 0.616 |      | 0.950 | 0.957 |       |       | 0.964 |       |      |      |      |      |
| Satd. Flow (perm)       | 271   | 3514  | 0    | 0     | 2208  | 0    | 1707  | 1720  | 1592  | 0     | 1830  | 1587  |      |      |      |      |
| Right Turn on Red       |       |       | Yes  |       |       | Yes  |       | Yes   |       |       | Yes   |       |      |      |      |      |
| Satd. Flow (RTOR)       | 18    |       |      |       | 5     |      |       | 207   |       |       | 191   |       |      |      |      |      |
| Link Speed (mph)        | 30    |       |      |       | 30    |      |       | 30    |       |       | 30    |       |      |      |      |      |
| Link Distance (ft)      | 210   |       |      |       | 361   |      |       | 859   |       |       | 290   |       |      |      |      |      |
| Travel Time (s)         | 4.8   |       |      |       | 8.2   |      |       | 19.5  |       |       | 6.6   |       |      |      |      |      |
| Confl. Peds. (#/hr)     | 2     |       | 2    | 2     |       | 2    | 3     |       | 1     | 1     |       | 3     |      |      |      |      |
| Peak Hour Factor        | 0.92  | 0.92  | 0.92 | 0.92  | 0.92  | 0.92 | 0.92  | 0.92  | 0.92  | 0.92  | 0.92  | 0.92  |      |      |      |      |
| Heavy Vehicles (%)      | 0%    | 0%    | 0%   | 0%    | 0%    | 0%   | 0%    | 0%    | 0%    | 0%    | 0%    | 0%    |      |      |      |      |
| Shared Lane Traffic (%) |       |       |      |       |       |      | 47%   |       |       |       |       |       |      |      |      |      |
| Lane Group Flow (vph)   | 11    | 902   | 0    | 0     | 1266  | 0    | 199   | 198   | 207   | 0     | 87    | 27    |      |      |      |      |
| Turn Type               | Perm  | NA    |      | pm+pt | NA    |      | Split | NA    | Perm  | Split | NA    | Perm  |      |      |      |      |
| Protected Phases        |       | 6     |      | 5     | 2     |      | 3     | 3     |       | 4     | 4     |       | 1    | 7    | 8    | 9    |
| Permitted Phases        | 6     |       |      | 2     |       |      |       |       | 3     |       |       | 4     |      |      |      |      |
| Detector Phase          | 6     | 6     |      | 5     | 2     |      | 3     | 3     | 3     | 4     | 4     | 4     |      |      |      |      |
| Switch Phase            |       |       |      |       |       |      |       |       |       |       |       |       |      |      |      |      |
| Minimum Initial (s)     | 15.0  | 15.0  |      | 4.0   | 15.0  |      | 10.0  | 10.0  | 10.0  | 4.0   | 4.0   | 4.0   | 1.0  | 1.0  | 1.0  | 1.0  |
| Minimum Split (s)       | 31.0  | 31.0  |      | 9.0   | 23.0  |      | 23.0  | 23.0  | 23.0  | 26.0  | 26.0  | 26.0  | 3.0  | 3.0  | 3.0  | 3.0  |
| Total Split (s)         | 46.0  | 46.0  |      | 15.0  | 56.0  |      | 35.0  | 35.0  | 35.0  | 15.0  | 15.0  | 15.0  | 3.0  | 3.0  | 3.0  | 3.0  |
| Total Split (%)         | 38.3% | 38.3% |      | 12.5% | 46.7% |      | 29.2% | 29.2% | 29.2% | 12.5% | 12.5% | 12.5% | 3%   | 3%   | 3%   | 3%   |
| Yellow Time (s)         | 4.0   | 4.0   |      | 3.0   | 4.0   |      | 3.0   | 3.0   | 3.0   | 3.0   | 3.0   | 3.0   | 2.0  | 2.0  | 2.0  | 2.0  |
| All-Red Time (s)        | 2.0   | 2.0   |      | 2.0   | 2.0   |      | 2.0   | 2.0   | 2.0   | 2.0   | 2.0   | 2.0   | 0.0  | 0.0  | 0.0  | 0.0  |
| Lost Time Adjust (s)    | 0.0   | 0.0   |      | 0.0   | 0.0   |      | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   |      |      |      |      |
| Total Lost Time (s)     | 6.0   | 6.0   |      | 6.0   | 6.0   |      | 5.0   | 5.0   | 5.0   |       | 5.0   | 5.0   |      |      |      |      |
| Lead/Lag                |       |       |      | Lead  | Lag   |      | Lag   | Lag   | Lag   | Lag   | Lag   | Lag   | Lead | Lead | Lead | Lag  |
| Lead-Lag Optimize?      |       |       |      |       |       |      |       |       |       |       |       |       |      |      |      |      |
| Recall Mode             | None  | None  |      | None  | None  |      | None  | None  | None  | None  | None  | None  | None | None | None | None |
| Act Effct Green (s)     | 51.6  | 51.6  |      | 51.6  | 51.6  |      | 16.2  | 16.2  | 16.2  |       | 9.9   | 9.9   |      |      |      |      |
| Actuated g/C Ratio      | 0.56  | 0.56  |      | 0.56  | 0.56  |      | 0.17  | 0.17  | 0.17  |       | 0.11  | 0.11  |      |      |      |      |
| v/c Ratio               | 0.07  | 0.46  |      | 1.03  | 0.67  |      | 0.67  | 0.66  | 0.46  |       | 0.45  | 0.08  |      |      |      |      |
| Control Delay           | 18.8  | 16.3  |      | 58.2  | 48.8  |      | 48.8  | 48.4  | 8.9   |       | 48.9  | 0.4   |      |      |      |      |
| Queue Delay             | 0.0   | 0.0   |      | 0.0   | 0.0   |      | 0.0   | 0.0   | 0.0   |       | 0.0   | 0.0   |      |      |      |      |
| Total Delay             | 18.8  | 16.3  |      | 58.2  | 48.8  |      | 48.8  | 48.4  | 8.9   |       | 48.9  | 0.4   |      |      |      |      |
| LOS                     | B     | B     |      | E     | D     |      | D     | A     | A     |       | D     | A     |      |      |      |      |
| Approach Delay          |       | 16.4  |      | 58.2  |       |      | 35.0  |       |       |       | 37.4  |       |      |      |      |      |
| Approach LOS            |       | B     |      | E     |       |      | C     |       |       |       | D     |       |      |      |      |      |
| Queue Length 50th (ft)  | 3     | 150   |      | ~414  |       |      | 112   | 112   | 0     |       | 48    | 0     |      |      |      |      |
| Queue Length 95th (ft)  | 19    | 362   |      | #855  |       |      | 231   | 230   | 63    |       | 112   | 0     |      |      |      |      |
| Internal Link Dist (ft) |       | 130   |      | 281   |       |      | 779   |       |       |       | 210   |       |      |      |      |      |
| Turn Bay Length (ft)    | 100   |       |      |       | 150   |      | 100   |       |       |       | 50    |       |      |      |      |      |
| Base Capacity (vph)     | 150   | 1960  |      | 1351  | 571   | 575  | 669   |       |       | 236   | 371   |       |      |      |      |      |
| Starvation Cap Reductn  | 0     | 0     |      | 0     | 0     | 0    | 0     | 0     | 0     | 0     | 0     | 0     |      |      |      |      |
| Spillback Cap Reductn   | 0     | 0     |      | 0     | 0     | 0    | 0     | 0     | 0     | 0     | 0     | 0     |      |      |      |      |
| Storage Cap Reductn     | 0     | 0     |      | 0     | 0     | 0    | 0     | 0     | 0     | 0     | 0     | 0     |      |      |      |      |
| Reduced v/c Ratio       | 0.07  | 0.46  |      | 0.94  | 0.35  | 0.34 | 0.31  |       |       | 0.37  | 0.07  |       |      |      |      |      |

| Intersection Summary                                            |                        |                        |
|-----------------------------------------------------------------|------------------------|------------------------|
| Area Type:                                                      | Other                  |                        |
| Cycle Length:                                                   | 120                    |                        |
| Actuated Cycle Length:                                          | 92.9                   |                        |
| Natural Cycle:                                                  | 150                    |                        |
| Control Type:                                                   | Actuated-Uncoordinated |                        |
| Maximum v/c Ratio:                                              | 1.03                   |                        |
| Intersection Signal Delay:                                      | 39.3                   | Intersection LOS: D    |
| Intersection Capacity Utilization                               | 87.1%                  | ICU Level of Service E |
| Analysis Period (min)                                           | 15                     |                        |
| ~ Volume exceeds capacity, queue is theoretically infinite.     |                        |                        |
| Queue shown is maximum after two cycles.                        |                        |                        |
| # 95th percentile volume exceeds capacity, queue may be longer. |                        |                        |
| Queue shown is maximum after two cycles.                        |                        |                        |

12239.00 :: Needham Street  
22: 2nd Avenue/Staples Driveway & Highland Avenue

2025 Build Conditions with Shuttle Service  
Timing Plan: Weekday Evening



12239.00 :: Needham Street  
23: Highland Avenue & Charles Street

2025 Build Conditions with Shuttle Service  
Timing Plan: Weekday Evening

| Intersection             |                                                                                   |                                                                                   |                                                                                   |       |                                                                                   |      |
|--------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-------|-----------------------------------------------------------------------------------|------|
| Int Delay, s/veh         | 4.8                                                                               |                                                                                   |                                                                                   |       |                                                                                   |      |
| Movement                 | EBL                                                                               | EBT                                                                               | WBT                                                                               | WBR   | SBL                                                                               | SBR  |
| Lane Configurations      |  |  |  |       |  |      |
| Traffic Vol, veh/h       | 65                                                                                | 820                                                                               | 1300                                                                              | 15    | 20                                                                                | 110  |
| Future Vol, veh/h        | 65                                                                                | 820                                                                               | 1300                                                                              | 15    | 20                                                                                | 110  |
| Conflicting Peds, #/hr   | 4                                                                                 | 0                                                                                 | 0                                                                                 | 4     | 0                                                                                 | 0    |
| Sign Control             | Free                                                                              | Free                                                                              | Free                                                                              | Free  | Stop                                                                              | Stop |
| RT Channelized           | -                                                                                 | None                                                                              | -                                                                                 | None  | -                                                                                 | None |
| Storage Length           | 100                                                                               | -                                                                                 | -                                                                                 | -     | 0                                                                                 | -    |
| Veh in Median Storage, # | -                                                                                 | 0                                                                                 | 0                                                                                 | -     | 0                                                                                 | -    |
| Grade, %                 | -                                                                                 | 0                                                                                 | 0                                                                                 | -     | 0                                                                                 | -    |
| Peak Hour Factor         | 92                                                                                | 92                                                                                | 92                                                                                | 92    | 92                                                                                | 92   |
| Heavy Vehicles, %        | 1                                                                                 | 1                                                                                 | 0                                                                                 | 0     | 0                                                                                 | 0    |
| Mvmt Flow                | 71                                                                                | 891                                                                               | 1413                                                                              | 16    | 22                                                                                | 120  |
| Major/Minor              |                                                                                   |                                                                                   |                                                                                   |       |                                                                                   |      |
| Major1                   | Major2                                                                            |                                                                                   | Minor2                                                                            |       |                                                                                   |      |
| Conflicting Flow All     | 1433                                                                              | 0                                                                                 | -                                                                                 | 0     | 2012                                                                              | 719  |
| Stage 1                  | -                                                                                 | -                                                                                 | -                                                                                 | -     | 1425                                                                              | -    |
| Stage 2                  | -                                                                                 | -                                                                                 | -                                                                                 | -     | 587                                                                               | -    |
| Critical Hdwy            | 4.12                                                                              | -                                                                                 | -                                                                                 | -     | 6.8                                                                               | 6.9  |
| Critical Hdwy Stg 1      | -                                                                                 | -                                                                                 | -                                                                                 | -     | 5.8                                                                               | -    |
| Critical Hdwy Stg 2      | -                                                                                 | -                                                                                 | -                                                                                 | -     | 5.8                                                                               | -    |
| Follow-up Hdwy           | 2.21                                                                              | -                                                                                 | -                                                                                 | -     | 3.5                                                                               | 3.3  |
| Pot Cap-1 Maneuver       | 475                                                                               | -                                                                                 | -                                                                                 | -     | 52                                                                                | 375  |
| Stage 1                  | -                                                                                 | -                                                                                 | -                                                                                 | -     | 191                                                                               | -    |
| Stage 2                  | -                                                                                 | -                                                                                 | -                                                                                 | -     | 524                                                                               | -    |
| Platoon blocked, %       | -                                                                                 | -                                                                                 | -                                                                                 | -     | -                                                                                 | -    |
| Mov Cap-1 Maneuver       | 475                                                                               | -                                                                                 | -                                                                                 | -     | 44                                                                                | 374  |
| Mov Cap-2 Maneuver       | -                                                                                 | -                                                                                 | -                                                                                 | -     | 44                                                                                | -    |
| Stage 1                  | -                                                                                 | -                                                                                 | -                                                                                 | -     | 190                                                                               | -    |
| Stage 2                  | -                                                                                 | -                                                                                 | -                                                                                 | -     | 444                                                                               | -    |
| Approach                 |                                                                                   |                                                                                   |                                                                                   |       |                                                                                   |      |
| EB                       | WB                                                                                |                                                                                   | SB                                                                                |       |                                                                                   |      |
| HCM Control Delay, s     | 1                                                                                 | 0                                                                                 | -                                                                                 | -     | 80.1                                                                              | -    |
| HCM LOS                  | -                                                                                 | -                                                                                 | -                                                                                 | -     | F                                                                                 | -    |
| Minor Lane/Major Mvmt    |                                                                                   |                                                                                   |                                                                                   |       |                                                                                   |      |
| EBL                      | EBT                                                                               | WBT                                                                               | WBR                                                                               | SBLn1 |                                                                                   |      |
| Capacity (veh/h)         | 475                                                                               | -                                                                                 | -                                                                                 | -     | 174                                                                               | -    |
| HCM Lane V/C Ratio       | 0.149                                                                             | -                                                                                 | -                                                                                 | -     | 0.812                                                                             | -    |
| HCM Control Delay (s)    | 13.9                                                                              | -                                                                                 | -                                                                                 | -     | 80.1                                                                              | -    |
| HCM Lane LOS             | B                                                                                 | -                                                                                 | -                                                                                 | -     | F                                                                                 | -    |
| HCM 95th %tile Q(veh)    | 0.5                                                                               | -                                                                                 | -                                                                                 | -     | 5.5                                                                               | -    |

12239.00 :: Needham Street  
24: Highland Avenue & Wexford Street

2025 Build Conditions with Shuttle Service  
Timing Plan: Weekday Evening

| Intersection             |                                                                                     |                                                                                     |                                                                                     |       |                                                                                     |      |
|--------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------|-------------------------------------------------------------------------------------|------|
| Int Delay, s/veh         | 26.4                                                                                |                                                                                     |                                                                                     |       |                                                                                     |      |
| Movement                 | EBL                                                                                 | EBT                                                                                 | WBT                                                                                 | WBR   | SBL                                                                                 | SBR  |
| Lane Configurations      |  |  |  |       |  |      |
| Traffic Vol, veh/h       | 110                                                                                 | 860                                                                                 | 1300                                                                                | 25    | 25                                                                                  | 205  |
| Future Vol, veh/h        | 110                                                                                 | 860                                                                                 | 1300                                                                                | 25    | 25                                                                                  | 205  |
| Conflicting Peds, #/hr   | 5                                                                                   | 0                                                                                   | 0                                                                                   | 5     | 0                                                                                   | 0    |
| Sign Control             | Free                                                                                | Free                                                                                | Free                                                                                | Free  | Stop                                                                                | Stop |
| RT Channelized           | -                                                                                   | None                                                                                | -                                                                                   | None  | -                                                                                   | None |
| Storage Length           | 100                                                                                 | -                                                                                   | -                                                                                   | -     | 0                                                                                   | -    |
| Veh in Median Storage, # | -                                                                                   | 0                                                                                   | 0                                                                                   | -     | 0                                                                                   | -    |
| Grade, %                 | -                                                                                   | 0                                                                                   | 0                                                                                   | -     | 0                                                                                   | -    |
| Peak Hour Factor         | 92                                                                                  | 92                                                                                  | 92                                                                                  | 92    | 92                                                                                  | 92   |
| Heavy Vehicles, %        | 0                                                                                   | 0                                                                                   | 0                                                                                   | 0     | 0                                                                                   | 0    |
| Mvmt Flow                | 120                                                                                 | 935                                                                                 | 1413                                                                                | 27    | 27                                                                                  | 223  |
| Major/Minor              |                                                                                     |                                                                                     |                                                                                     |       |                                                                                     |      |
| Major1                   | Major2                                                                              |                                                                                     | Minor2                                                                              |       |                                                                                     |      |
| Conflicting Flow All     | 1445                                                                                | 0                                                                                   | -                                                                                   | 0     | 2139                                                                                | 725  |
| Stage 1                  | -                                                                                   | -                                                                                   | -                                                                                   | -     | 1432                                                                                | -    |
| Stage 2                  | -                                                                                   | -                                                                                   | -                                                                                   | -     | 707                                                                                 | -    |
| Critical Hdwy            | 4.1                                                                                 | -                                                                                   | -                                                                                   | -     | 6.8                                                                                 | 6.9  |
| Critical Hdwy Stg 1      | -                                                                                   | -                                                                                   | -                                                                                   | -     | 5.8                                                                                 | -    |
| Critical Hdwy Stg 2      | -                                                                                   | -                                                                                   | -                                                                                   | -     | 5.8                                                                                 | -    |
| Follow-up Hdwy           | 2.2                                                                                 | -                                                                                   | -                                                                                   | -     | 3.5                                                                                 | 3.3  |
| Pot Cap-1 Maneuver       | 475                                                                                 | -                                                                                   | -                                                                                   | -     | 43                                                                                  | 372  |
| Stage 1                  | -                                                                                   | -                                                                                   | -                                                                                   | -     | 190                                                                                 | -    |
| Stage 2                  | -                                                                                   | -                                                                                   | -                                                                                   | -     | 455                                                                                 | -    |
| Platoon blocked, %       | -                                                                                   | -                                                                                   | -                                                                                   | -     | -                                                                                   | -    |
| Mov Cap-1 Maneuver       | 475                                                                                 | -                                                                                   | -                                                                                   | -     | 32                                                                                  | 370  |
| Mov Cap-2 Maneuver       | -                                                                                   | -                                                                                   | -                                                                                   | -     | 32                                                                                  | -    |
| Stage 1                  | -                                                                                   | -                                                                                   | -                                                                                   | -     | 189                                                                                 | -    |
| Stage 2                  | -                                                                                   | -                                                                                   | -                                                                                   | -     | 339                                                                                 | -    |
| Approach                 |                                                                                     |                                                                                     |                                                                                     |       |                                                                                     |      |
| EB                       | WB                                                                                  |                                                                                     | SB                                                                                  |       |                                                                                     |      |
| HCM Control Delay, s     | 1.7                                                                                 | 0                                                                                   | -                                                                                   | -     | 283.2                                                                               | -    |
| HCM LOS                  | -                                                                                   | -                                                                                   | -                                                                                   | -     | F                                                                                   | -    |
| Minor Lane/Major Mvmt    |                                                                                     |                                                                                     |                                                                                     |       |                                                                                     |      |
| EBL                      | EBT                                                                                 | WBT                                                                                 | WBR                                                                                 | SBLn1 |                                                                                     |      |
| Capacity (veh/h)         | 475                                                                                 | -                                                                                   | -                                                                                   | -     | 172                                                                                 | -    |
| HCM Lane V/C Ratio       | 0.252                                                                               | -                                                                                   | -                                                                                   | -     | 1.453                                                                               | -    |
| HCM Control Delay (s)    | 15.1                                                                                | -                                                                                   | -                                                                                   | -     | 283.2                                                                               | -    |
| HCM Lane LOS             | C                                                                                   | -                                                                                   | -                                                                                   | -     | F                                                                                   | -    |
| HCM 95th %tile Q(veh)    | 1                                                                                   | -                                                                                   | -                                                                                   | -     | 15.7                                                                                | -    |

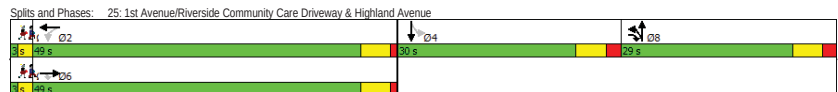


12239.00 :: Needham Street  
25: 1st Avenue/Riverside Community Care Driveway & Highland Avenue

2025 Build Conditions with Shuttle Service  
Timing Plan: Weekday Evening

| Lane Group              | EBL   | EBT   | EBR   | WBL   | WBT   | WBR   | NBL   | NBT   | NBR   | SBL   | SBT  | SBR  | Ø1   | Ø5 |
|-------------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|------|------|------|----|
| Lane Configurations     |       | EBT   | EBR   | WBL   | WBT   | WBR   | NBL   | NBT   | NBR   | SBL   | SBT  | SBR  |      |    |
| Traffic Volume (vph)    | 0     | 935   | 195   | 5     | 1500  | 15    | 485   | 0     | 90    | 0     | 0    | 20   |      |    |
| Future Volume (vph)     | 0     | 935   | 195   | 5     | 1500  | 15    | 485   | 0     | 90    | 0     | 0    | 20   |      |    |
| Ideal Flow (vphpl)      | 1900  | 1900  | 1900  | 1900  | 1900  | 1900  | 1900  | 1900  | 1900  | 1900  | 1900 | 1900 |      |    |
| Storage Length (ft)     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 200   | 0     | 0    | 0    |      |    |
| Storage Lanes           | 0     | 1     | 0     | 0     | 1     | 0     | 1     | 0     | 0     | 0     | 0    | 0    |      |    |
| Taper Length (ft)       | 25    |       | 25    |       | 25    |       | 25    |       | 25    |       | 25   |      |      |    |
| Satd. Flow (prot)       | 0     | 3610  | 1615  | 0     | 3606  | 0     | 1698  | 1637  | 0     | 0     | 1644 | 0    |      |    |
| Flt Permitted           |       |       |       |       | 0.952 |       | 0.950 | 0.967 |       |       |      |      |      |    |
| Satd. Flow (perm)       | 0     | 3610  | 1578  | 0     | 3433  | 0     | 1698  | 1637  | 0     | 0     | 1644 | 0    |      |    |
| Right Turn on Red       |       | Yes   |       |       | Yes   |       |       | Yes   |       |       | Yes  |      |      |    |
| Satd. Flow (RTOR)       |       | 212   |       |       | 1     |       |       | 98    |       |       | 98   |      |      |    |
| Link Speed (mph)        |       | 30    |       |       | 30    |       |       | 30    |       |       | 30   |      |      |    |
| Link Distance (ft)      |       | 377   |       |       | 272   |       |       | 825   |       |       | 147  |      |      |    |
| Travel Time (s)         |       | 8.6   |       |       | 6.2   |       |       | 18.8  |       |       | 3.3  |      |      |    |
| Confl. Peds. (#/hr)     |       |       | 1     | 1     |       |       |       |       | 2     | 2     |      |      |      |    |
| Peak Hour Factor        | 0.92  | 0.92  | 0.92  | 0.92  | 0.92  | 0.92  | 0.92  | 0.92  | 0.92  | 0.92  | 0.92 | 0.92 |      |    |
| Heavy Vehicles (%)      | 0%    | 0%    | 0%    | 0%    | 0%    | 0%    | 1%    | 1%    | 0%    | 0%    | 0%   | 0%   |      |    |
| Shared Lane Traffic (%) |       |       |       |       |       |       | 40%   |       |       |       |      |      |      |    |
| Lane Group Flow (vph)   | 0     | 1016  | 212   | 0     | 1651  | 0     | 316   | 309   | 0     | 0     | 22   | 0    |      |    |
| Turn Type               |       | NA    | pm+ov | Perm  | NA    |       | Split | NA    |       |       |      |      |      |    |
| Protected Phases        |       | 6     | 8     |       | 2     |       | 8     | 8     |       |       | 4    |      | 1    | 5  |
| Permitted Phases        |       | 6     |       | 2     |       |       |       |       |       | 4     |      |      |      |    |
| Detector Phase          |       | 6     | 8     | 2     | 2     |       | 8     | 8     |       | 4     | 4    |      |      |    |
| Switch Phase            |       |       |       |       |       |       |       |       |       |       |      |      |      |    |
| Minimum Initial (s)     | 10.0  | 6.0   | 10.0  | 10.0  |       | 6.0   | 6.0   |       | 6.0   | 6.0   |      | 1.0  | 1.0  |    |
| Minimum Split (s)       | 25.0  | 12.0  | 16.0  | 16.0  |       | 12.0  | 12.0  |       | 29.0  | 29.0  |      | 3.0  | 3.0  |    |
| Total Split (s)         | 49.0  | 29.0  | 49.0  | 49.0  |       | 29.0  | 29.0  |       | 30.0  | 30.0  |      | 3.0  | 3.0  |    |
| Total Split (%)         | 44.1% | 26.1% | 44.1% | 44.1% |       | 26.1% | 26.1% |       | 27.0% | 27.0% |      | 3%   | 3%   |    |
| Yellow Time (s)         | 4.0   | 4.0   | 4.0   | 4.0   |       | 4.0   | 4.0   |       | 4.0   | 4.0   |      | 2.0  | 2.0  |    |
| All-Red Time (s)        | 1.0   | 2.0   | 1.0   | 1.0   |       | 2.0   | 2.0   |       | 2.0   | 2.0   |      | 0.0  | 0.0  |    |
| Last Time Adjust (s)    | 0.0   | 0.0   | 0.0   | 0.0   |       | 0.0   | 0.0   |       | 0.0   | 0.0   |      | 0.0  | 0.0  |    |
| Total Lost Time (s)     | 5.0   | 6.0   |       | 5.0   |       | 6.0   | 6.0   |       |       |       | 6.0  |      |      |    |
| Lead/Lag                | Lag   |       | Lag   | Lag   |       |       |       |       |       |       |      | Lead | Lead |    |
| Lead-Lag Optimize?      | Yes   |       | Yes   | Yes   |       |       |       |       |       |       |      | Yes  | Yes  |    |
| Recall Mode             | Min   | None  | Min   | Min   |       | None  | None  |       | None  | None  |      | None | None |    |
| Act Effct Green (s)     | 45.2  | 64.7  |       | 45.7  |       | 20.5  | 20.5  |       |       |       | 8.8  |      |      |    |
| Actuated g/C Ratio      | 0.54  | 0.77  |       | 0.54  |       | 0.24  | 0.24  |       |       |       | 0.10 |      |      |    |
| v/c Ratio               | 0.52  | 0.17  |       | 0.89  |       | 0.76  | 0.65  |       |       |       | 0.08 |      |      |    |
| Control Delay           | 16.7  | 1.0   |       | 27.4  |       | 45.1  | 28.4  |       |       |       | 0.7  |      |      |    |
| Queue Delay             | 0.0   | 0.0   |       | 0.0   |       | 0.0   | 0.0   |       |       |       | 0.0  |      |      |    |
| Total Delay             | 16.7  | 1.0   |       | 27.4  |       | 45.1  | 28.4  |       |       |       | 0.7  |      |      |    |
| LOS                     | B     | A     |       | C     |       | D     | C     |       |       |       | A    |      |      |    |
| Approach Delay          | 14.0  |       |       | 27.4  |       |       | 36.8  |       |       |       | 0.7  |      |      |    |
| Approach LOS            | B     |       |       | C     |       |       | D     |       |       |       | A    |      |      |    |
| Queue Length 50th (ft)  | 142   | 0     |       | 321   |       | 138   | 87    |       |       |       | 0    |      |      |    |
| Queue Length 95th (ft)  | 386   | 22    |       | #854  |       | #398  | #265  |       |       |       | 0    |      |      |    |
| Internal Link Dist (ft) | 297   |       |       | 192   |       |       | 745   |       |       |       | 67   |      |      |    |
| Turn Bay Length (ft)    |       |       |       |       |       |       |       |       |       |       |      |      |      |    |
| Base Capacity (vph)     | 1938  | 1312  |       | 1862  |       | 476   | 530   |       |       |       | 550  |      |      |    |
| Starvation Cap Reductn  | 0     | 0     |       | 0     |       | 0     | 0     |       |       |       | 0    |      |      |    |
| Spillback Cap Reductn   | 0     | 0     |       | 0     |       | 0     | 0     |       |       |       | 0    |      |      |    |
| Storage Cap Reductn     | 0     | 0     |       | 0     |       | 0     | 0     |       |       |       | 0    |      |      |    |
| Reduced v/c Ratio       | 0.52  | 0.16  |       | 0.89  |       | 0.66  | 0.58  |       |       |       | 0.04 |      |      |    |

| Intersection Summary                                            |                        |
|-----------------------------------------------------------------|------------------------|
| Area Type:                                                      | Other                  |
| Cycle Length: 111                                               |                        |
| Actuated Cycle Length: 84.2                                     |                        |
| Natural Cycle: 120                                              |                        |
| Control Type: Actuated-Uncoordinated                            |                        |
| Maximum v/c Ratio: 0.89                                         |                        |
| Intersection Signal Delay: 24.2                                 | Intersection LOS: C    |
| Intersection Capacity Utilization 77.5%                         | ICU Level of Service D |
| Analysis Period (min): 15                                       |                        |
| # 95th percentile volume exceeds capacity, queue may be longer. |                        |
| Queue shown is maximum after two cycles.                        |                        |



12239.00 :: Needham Street  
26: I-95 NB Ramps & Highland Avenue

2025 Build Conditions with Shuttle Service  
Timing Plan: Weekday Evening

| Intersection             |        |      |       |        |       |       |        |      |       |      |      |       |  |
|--------------------------|--------|------|-------|--------|-------|-------|--------|------|-------|------|------|-------|--|
| Int Delay, s/veh         | 1.4    |      |       |        |       |       |        |      |       |      |      |       |  |
| Movement                 | EBL    | EBT  | EBR   | WBL    | WBT   | WBR   | NBL    | NBT  | NBR   | SBL  | SBT  | SBR   |  |
| Lane Configurations      |        | ↕↕   | ↕     |        | ↕↕    |       |        |      | ↕     |      |      | ↕     |  |
| Traffic Vol, veh/h       | 0      | 925  | 455   | 0      | 1060  | 945   | 0      | 0    | 205   | 0    | 0    | 110   |  |
| Future Vol, veh/h        | 0      | 925  | 455   | 0      | 1060  | 945   | 0      | 0    | 205   | 0    | 0    | 110   |  |
| Conflicting Peds, #/hr   | 3      | 0    | 0     | 0      | 0     | 3     | 0      | 0    | 0     | 0    | 0    | 3     |  |
| Sign Control             | Free   | Free | Free  | Free   | Free  | Free  | Stop   | Stop | Stop  | Stop | Stop | Stop  |  |
| RT Channelized           | -      | -    | Yield | -      | -     | Yield | -      | -    | Yield | -    | -    | Yield |  |
| Storage Length           | -      | -    | 0     | -      | -     | -     | -      | -    | 0     | -    | -    | 0     |  |
| Veh in Median Storage, # | -      | 0    | -     | -      | 0     | -     | -      | 0    | -     | -    | 0    | -     |  |
| Grade, %                 | -      | 0    | -     | -      | 0     | -     | -      | 0    | -     | -    | 0    | -     |  |
| Peak Hour Factor         | 92     | 92   | 92    | 92     | 92    | 92    | 92     | 92   | 92    | 92   | 92   | 92    |  |
| Heavy Vehicles, %        | 1      | 1    | 1     | 1      | 1     | 1     | 2      | 2    | 2     | 2    | 2    | 2     |  |
| Mvmt Flow                | 0      | 1005 | 495   | 0      | 1152  | 1027  | 0      | 0    | 223   | 0    | 0    | 120   |  |
| Major/Minor              |        |      |       |        |       |       |        |      |       |      |      |       |  |
| Major1                   | Major2 |      |       | Minor1 |       |       | Minor2 |      |       |      |      |       |  |
| Conflicting Flow All     | -      | 0    | 0     | -      | -     | 0     | -      | -    | 503   | -    | -    | 582   |  |
| Stage 1                  | -      | -    | -     | -      | -     | -     | -      | -    | -     | -    | -    | -     |  |
| Stage 2                  | -      | -    | -     | -      | -     | -     | -      | -    | -     | -    | -    | -     |  |
| Critical Hdwy            | -      | -    | -     | -      | -     | -     | -      | -    | 6.94  | -    | -    | 6.94  |  |
| Critical Hdwy Stg 1      | -      | -    | -     | -      | -     | -     | -      | -    | -     | -    | -    | -     |  |
| Critical Hdwy Stg 2      | -      | -    | -     | -      | -     | -     | -      | -    | -     | -    | -    | -     |  |
| Follow-up Hdwy           | -      | -    | -     | -      | -     | -     | -      | -    | 3.32  | -    | -    | 3.32  |  |
| Pot Cap-1 Maneuver       | 0      | -    | 0     | -      | -     | 0     | 0      | 514  | 0     | 0    | 456  |       |  |
| Stage 1                  | 0      | -    | 0     | -      | -     | 0     | 0      | 0    | -     | 0    | 0    | -     |  |
| Stage 2                  | 0      | -    | 0     | -      | -     | 0     | 0      | 0    | -     | 0    | 0    | -     |  |
| Platoon blocked, %       | -      | -    | -     | -      | -     | -     | -      | -    | -     | -    | -    | -     |  |
| Mov Cap-1 Maneuver       | -      | -    | -     | -      | -     | -     | -      | -    | 514   | -    | -    | 454   |  |
| Mov Cap-2 Maneuver       | -      | -    | -     | -      | -     | -     | -      | -    | -     | -    | -    | -     |  |
| Stage 1                  | -      | -    | -     | -      | -     | -     | -      | -    | -     | -    | -    | -     |  |
| Stage 2                  | -      | -    | -     | -      | -     | -     | -      | -    | -     | -    | -    | -     |  |
| Approach                 |        |      |       |        |       |       |        |      |       |      |      |       |  |
| EB                       | WB     |      |       | NB     |       |       | SB     |      |       |      |      |       |  |
| HCM Control Delay, s     | 0      | 0    |       |        | 17.3  |       |        | 15.7 |       |      |      |       |  |
| HCM LOS                  |        |      |       | C      |       |       | C      |      |       |      |      |       |  |
| Minor Lane/Major Mvmt    |        |      |       |        |       |       |        |      |       |      |      |       |  |
| NBLn1                    | EBT    | EBR  | WBT   | WBR    | SBLn1 |       |        |      |       |      |      |       |  |
| Capacity (veh/h)         | 514    | -    | -     | -      | 454   |       |        |      |       |      |      |       |  |
| HCM Lane V/C Ratio       | 0.434  | -    | -     | -      | 0.263 |       |        |      |       |      |      |       |  |
| HCM Control Delay (s)    | 17.3   | -    | -     | -      | 15.7  |       |        |      |       |      |      |       |  |
| HCM Lane LOS             | C      | -    | -     | -      | C     |       |        |      |       |      |      |       |  |
| HCM 95th %ile Q(veh)     | 2.2    | -    | -     | -      | 1     |       |        |      |       |      |      |       |  |

12239.00 :: Needham Street  
27: I-95 SB Ramps & Highland Avenue

2025 Build Conditions with Shuttle Service  
Timing Plan: Weekday Evening

| Intersection             |        |      |        |      |        |       |        |      |       |      |      |       |
|--------------------------|--------|------|--------|------|--------|-------|--------|------|-------|------|------|-------|
| Int Delay, s/veh         | 8.4    |      |        |      |        |       |        |      |       |      |      |       |
| Movement                 | EBL    | EBT  | EBR    | WBL  | WBT    | WBR   | NBL    | NBT  | NBR   | SBL  | SBT  | SBR   |
| Lane Configurations      |        | ↕↕   |        |      | ↕↕     | ↕     |        |      | ↕     |      |      | ↕     |
| Traffic Vol, veh/h       | 0      | 1005 | 260    | 0    | 745    | 425   | 0      | 0    | 375   | 0    | 0    | 415   |
| Future Vol, veh/h        | 0      | 1005 | 260    | 0    | 745    | 425   | 0      | 0    | 375   | 0    | 0    | 415   |
| Conflicting Peds, #/hr   | 3      | 0    | 0      | 0    | 0      | 3     | 0      | 0    | 0     | 0    | 0    | 3     |
| Sign Control             | Free   | Free | Free   | Free | Free   | Free  | Stop   | Stop | Stop  | Stop | Stop | Stop  |
| RT Channelized           | -      | -    | Yield  | -    | -      | Yield | -      | -    | Yield | -    | -    | Yield |
| Storage Length           | -      | -    | -      | -    | -      | 0     | -      | -    | 0     | -    | -    | 0     |
| Veh in Median Storage, # | -      | 0    | -      | -    | 0      | -     | -      | 0    | -     | -    | 0    | -     |
| Grade, %                 | -      | 0    | -      | -    | 0      | -     | -      | 0    | -     | -    | 0    | -     |
| Peak Hour Factor         | 92     | 92   | 92     | 92   | 92     | 92    | 92     | 92   | 92    | 92   | 92   | 92    |
| Heavy Vehicles, %        | 1      | 1    | 1      | 1    | 1      | 1     | 2      | 2    | 2     | 0    | 0    | 0     |
| Mvmt Flow                | 0      | 1092 | 283    | 0    | 810    | 462   | 0      | 0    | 408   | 0    | 0    | 451   |
| Major/Minor              | Major1 |      | Major2 |      | Minor1 |       | Minor2 |      |       |      |      |       |
| Conflicting Flow All     | -      | 0    | 0      | -    | -      | 0     | -      | -    | 546   | -    | -    | 411   |
| Stage 1                  | -      | -    | -      | -    | -      | -     | -      | -    | -     | -    | -    | -     |
| Stage 2                  | -      | -    | -      | -    | -      | -     | -      | -    | -     | -    | -    | -     |
| Critical Hdwy            | -      | -    | -      | -    | -      | -     | -      | -    | 6.94  | -    | -    | 6.9   |
| Critical Hdwy Stg 1      | -      | -    | -      | -    | -      | -     | -      | -    | -     | -    | -    | -     |
| Critical Hdwy Stg 2      | -      | -    | -      | -    | -      | -     | -      | -    | -     | -    | -    | -     |
| Follow-up Hdwy           | -      | -    | -      | -    | -      | -     | -      | -    | 3.32  | -    | -    | 3.3   |
| Pot Cap-1 Maneuver       | 0      | -    | -      | 0    | -      | -     | 0      | 0    | 482   | 0    | 0    | 596   |
| Stage 1                  | 0      | -    | -      | 0    | -      | -     | 0      | 0    | -     | 0    | 0    | -     |
| Stage 2                  | 0      | -    | -      | 0    | -      | -     | 0      | 0    | -     | 0    | 0    | -     |
| Platoon blocked, %       | -      | -    | -      | -    | -      | -     | -      | -    | -     | -    | -    | -     |
| Mov Cap-1 Maneuver       | -      | -    | -      | -    | -      | -     | -      | -    | 482   | -    | -    | 593   |
| Mov Cap-2 Maneuver       | -      | -    | -      | -    | -      | -     | -      | -    | -     | -    | -    | -     |
| Stage 1                  | -      | -    | -      | -    | -      | -     | -      | -    | -     | -    | -    | -     |
| Stage 2                  | -      | -    | -      | -    | -      | -     | -      | -    | -     | -    | -    | -     |
| Approach                 | EB     |      | WB     |      | NB     |       | SB     |      |       |      |      |       |
| HCM Control Delay, s     | 0      |      | 0      |      | 41.4   |       | 27.8   |      |       |      |      |       |
| HCM LOS                  |        |      |        |      | E      |       | D      |      |       |      |      |       |
| Minor Lane/Major Mvmt    | NBLn1  | EBT  | EBR    | WBT  | WBR    | SBLn1 |        |      |       |      |      |       |
| Capacity (veh/h)         | 482    | -    | -      | -    | -      | 593   |        |      |       |      |      |       |
| HCM Lane V/C Ratio       | 0.846  | -    | -      | -    | -      | 0.761 |        |      |       |      |      |       |
| HCM Control Delay (s)    | 41.4   | -    | -      | -    | -      | 27.8  |        |      |       |      |      |       |
| HCM Lane LOS             | E      | -    | -      | -    | -      | D     |        |      |       |      |      |       |
| HCM 95th %tile Q(veh)    | 8.6    | -    | -      | -    | -      | 6.9   |        |      |       |      |      |       |

12239.00 :: Needham Street  
1: Chestnut Street & Route 9 WB Access Road

2025 Build Conditions with Shuttle Service  
Timing Plan: Saturday Midday

| Intersection               |       |       |       |       |      |      |      |      |      |      |      |      |
|----------------------------|-------|-------|-------|-------|------|------|------|------|------|------|------|------|
| Intersection Delay, s/veh  | 27.8  |       |       |       |      |      |      |      |      |      |      |      |
| Intersection LOS           | D     |       |       |       |      |      |      |      |      |      |      |      |
| Movement                   | EBL   | EBT   | EBR   | WBL   | WBT  | WBR  | NBL  | NBT  | NBR  | SBL  | SBT  | SBR  |
| Lane Configurations        | ↕     |       |       | ↕     |      |      | ↕    |      |      | ↕    |      |      |
| Traffic Vol, veh/h         | 2     | 0     | 1     | 70    | 25   | 35   | 65   | 445  | 1    | 1    | 425  | 155  |
| Future Vol, veh/h          | 2     | 0     | 1     | 70    | 25   | 35   | 65   | 445  | 1    | 1    | 425  | 155  |
| Peak Hour Factor           | 0.92  | 0.92  | 0.92  | 0.92  | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Heavy Vehicles, %          | 0     | 0     | 0     | 0     | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    |
| Mvmt Flow                  | 2     | 0     | 1     | 76    | 27   | 38   | 71   | 484  | 1    | 1    | 462  | 168  |
| Number of Lanes            | 0     | 1     | 0     | 0     | 1    | 0    | 0    | 1    | 0    | 0    | 1    | 0    |
| Approach                   | EB    |       | WB    |       | NB   |      | SB   |      |      |      |      |      |
| Opposing Approach          | WB    |       | EB    |       | SB   |      | NB   |      |      |      |      |      |
| Opposing Lanes             | 1     |       | 1     |       | 1    |      | 1    |      |      |      |      |      |
| Conflicting Approach Left  | SB    |       | NB    |       | EB   |      | WB   |      |      |      |      |      |
| Conflicting Lanes Left     | 1     |       | 1     |       | 1    |      | 1    |      |      |      |      |      |
| Conflicting Approach Right | NB    |       | SB    |       | WB   |      | EB   |      |      |      |      |      |
| Conflicting Lanes Right    | 1     |       | 1     |       | 1    |      | 1    |      |      |      |      |      |
| HCM Control Delay          | 10.3  |       | 12    |       | 26.6 |      | 32.5 |      |      |      |      |      |
| HCM LOS                    | B     |       | B     |       | D    |      | D    |      |      |      |      |      |
| Lane                       | NBLn1 | EBLn1 | WBLn1 | SBLn1 |      |      |      |      |      |      |      |      |
| Vol Left, %                | 13%   | 67%   | 54%   | 0%    |      |      |      |      |      |      |      |      |
| Vol Thru, %                | 87%   | 0%    | 19%   | 73%   |      |      |      |      |      |      |      |      |
| Vol Right, %               | 0%    | 33%   | 27%   | 27%   |      |      |      |      |      |      |      |      |
| Sign Control               | Stop  | Stop  | Stop  | Stop  |      |      |      |      |      |      |      |      |
| Traffic Vol by Lane        | 511   | 3     | 130   | 581   |      |      |      |      |      |      |      |      |
| LT Vol                     | 65    | 2     | 70    | 1     |      |      |      |      |      |      |      |      |
| Through Vol                | 445   | 0     | 25    | 425   |      |      |      |      |      |      |      |      |
| RT Vol                     | 1     | 1     | 35    | 155   |      |      |      |      |      |      |      |      |
| Lane Flow Rate             | 555   | 3     | 141   | 632   |      |      |      |      |      |      |      |      |
| Geometry Grp               | 1     | 1     | 1     | 1     |      |      |      |      |      |      |      |      |
| Degree of Util (X)         | 0.808 | 0.006 | 0.259 | 0.875 |      |      |      |      |      |      |      |      |
| Departure Headway (Hd)     | 5.234 | 7.132 | 6.609 | 4.986 |      |      |      |      |      |      |      |      |
| Convergence, Y/N           | Yes   | Yes   | Yes   | Yes   |      |      |      |      |      |      |      |      |
| Cap                        | 689   | 498   | 543   | 726   |      |      |      |      |      |      |      |      |
| Service Time               | 3.274 | 5.223 | 4.669 | 3.024 |      |      |      |      |      |      |      |      |
| HCM Lane V/C Ratio         | 0.806 | 0.006 | 0.26  | 0.871 |      |      |      |      |      |      |      |      |
| HCM Control Delay          | 26.6  | 10.3  | 12    | 32.5  |      |      |      |      |      |      |      |      |
| HCM Lane LOS               | D     | B     | B     | D     |      |      |      |      |      |      |      |      |
| HCM 95th-tile Q            | 8.4   | 0     | 1     | 10.7  |      |      |      |      |      |      |      |      |

12239.00 :: Needham Street  
2: Chestnut Street & Route 9 EB Access Road

2025 Build Conditions with Shuttle Service  
Timing Plan: Saturday Midday

| Intersection               |       |       |       |       |      |      |      |      |      |      |      |      |    |
|----------------------------|-------|-------|-------|-------|------|------|------|------|------|------|------|------|----|
| Intersection Delay, s/veh  | 28.7  |       |       |       |      |      |      |      |      |      |      |      |    |
| Intersection LOS           | D     |       |       |       |      |      |      |      |      |      |      |      |    |
| Movement                   | EBL   | EBT   | EBR   | WBL   | WBT  | WBR  | NBL  | NBT  | NBR  | SBL  | SBT  | SBR  |    |
| Lane Configurations        |       | ↔     |       |       | ↔    |      |      | ↔    |      |      | ↔    |      |    |
| Traffic Vol, veh/h         | 110   | 125   | 30    | 0     | 2    | 20   | 0    | 380  | 50   | 105  | 390  | 2    |    |
| Future Vol, veh/h          | 110   | 125   | 30    | 0     | 2    | 20   | 0    | 380  | 50   | 105  | 390  | 2    |    |
| Peak Hour Factor           | 0.92  | 0.92  | 0.92  | 0.92  | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |    |
| Heavy Vehicles, %          | 0     | 0     | 0     | 0     | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    |    |
| Mvmt Flow                  | 120   | 136   | 33    | 0     | 2    | 22   | 0    | 413  | 54   | 114  | 424  | 2    |    |
| Number of Lanes            | 0     | 1     | 0     | 0     | 1    | 0    | 0    | 1    | 0    | 0    | 1    | 0    |    |
| Approach                   | EB    |       |       |       | WB   |      |      |      | NB   |      |      |      | SB |
| Opposing Approach          | WB    |       |       |       | EB   |      |      |      | SB   |      |      |      | NB |
| Opposing Lanes             | 1     |       |       |       | 1    |      |      |      | 1    |      |      |      | 1  |
| Conflicting Approach Left  | SB    |       |       |       | NB   |      |      |      | EB   |      |      |      | WB |
| Conflicting Lanes Left     | 1     |       |       |       | 1    |      |      |      | 1    |      |      |      | 1  |
| Conflicting Approach Right | NB    |       |       |       | SB   |      |      |      | WB   |      |      |      | EB |
| Conflicting Lanes Right    | 1     |       |       |       | 1    |      |      |      | 1    |      |      |      | 1  |
| HCM Control Delay          | 17.5  |       |       |       | 10.7 |      |      |      | 25.8 |      |      |      | 38 |
| HCM LOS                    | C     |       |       |       | B    |      |      |      | D    |      |      |      | E  |
| Lane                       | NBLn1 | EBLn1 | WBLn1 | SBLn1 |      |      |      |      |      |      |      |      |    |
| Vol Left, %                | 0%    | 42%   | 0%    | 21%   |      |      |      |      |      |      |      |      |    |
| Vol Thru, %                | 88%   | 47%   | 9%    | 78%   |      |      |      |      |      |      |      |      |    |
| Vol Right, %               | 12%   | 11%   | 91%   | 0%    |      |      |      |      |      |      |      |      |    |
| Sign Control               | Stop  | Stop  | Stop  | Stop  |      |      |      |      |      |      |      |      |    |
| Traffic Vol by Lane        | 430   | 265   | 22    | 497   |      |      |      |      |      |      |      |      |    |
| LT Vol                     | 0     | 110   | 0     | 105   |      |      |      |      |      |      |      |      |    |
| Through Vol                | 380   | 125   | 2     | 390   |      |      |      |      |      |      |      |      |    |
| RT Vol                     | 50    | 30    | 20    | 2     |      |      |      |      |      |      |      |      |    |
| Lane Flow Rate             | 467   | 288   | 24    | 540   |      |      |      |      |      |      |      |      |    |
| Geometry Grp               | 1     | 1     | 1     | 1     |      |      |      |      |      |      |      |      |    |
| Degree of Util (X)         | 0.767 | 0.54  | 0.048 | 0.884 |      |      |      |      |      |      |      |      |    |
| Departure Headway (Hd)     | 5.905 | 6.743 | 7.209 | 5.889 |      |      |      |      |      |      |      |      |    |
| Convergence, Y/N           | Yes   | Yes   | Yes   | Yes   |      |      |      |      |      |      |      |      |    |
| Cap                        | 612   | 536   | 494   | 616   |      |      |      |      |      |      |      |      |    |
| Service Time               | 3.949 | 4.789 | 5.292 | 3.93  |      |      |      |      |      |      |      |      |    |
| HCM Lane V/C Ratio         | 0.763 | 0.537 | 0.049 | 0.877 |      |      |      |      |      |      |      |      |    |
| HCM Control Delay          | 25.8  | 17.5  | 10.7  | 38    |      |      |      |      |      |      |      |      |    |
| HCM Lane LOS               | D     | C     | B     | E     |      |      |      |      |      |      |      |      |    |
| HCM 95th-ile Q             | 7.1   | 3.2   | 0.2   | 10.5  |      |      |      |      |      |      |      |      |    |

12239.00 :: Needham Street  
3: Chestnut Street & Elliot Street

2025 Build Conditions with Shuttle Service  
Timing Plan: Saturday Midday

|                         |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|-------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
| Lane Group              | EBL                                                                                 | EBT                                                                                 | EBR                                                                                 | WBL                                                                                 | WBT                                                                                 | WBR                                                                                 | NBL                                                                                 | NBT                                                                                 | NBR                                                                                 | SBL                                                                                 | SBT                                                                                 | SBR                                                                                 | Ø3                                                                                  |                                                                                     |                                                                                     |
| Lane Configurations     |  |                                                                                     |                                                                                     |                                                                                     |  |                                                                                     |                                                                                     |  |                                                                                     |                                                                                     |  |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Traffic Volume (vph)    | 185                                                                                 | 155                                                                                 | 45                                                                                  | 5                                                                                   | 125                                                                                 | 65                                                                                  | 80                                                                                  | 250                                                                                 | 10                                                                                  | 55                                                                                  | 330                                                                                 | 195                                                                                 |                                                                                     |                                                                                     |                                                                                     |
| Future Volume (vph)     | 185                                                                                 | 155                                                                                 | 45                                                                                  | 5                                                                                   | 125                                                                                 | 65                                                                                  | 80                                                                                  | 250                                                                                 | 10                                                                                  | 55                                                                                  | 330                                                                                 | 195                                                                                 |                                                                                     |                                                                                     |                                                                                     |
| Ideal Flow (vphpl)      | 1900                                                                                | 1900                                                                                | 1900                                                                                | 1900                                                                                | 1900                                                                                | 1900                                                                                | 1900                                                                                | 1900                                                                                | 1900                                                                                | 1900                                                                                | 1900                                                                                | 1900                                                                                |                                                                                     |                                                                                     |                                                                                     |
| Satd. Flow (prot)       | 0                                                                                   | 1821                                                                                | 0                                                                                   | 0                                                                                   | 1775                                                                                | 0                                                                                   | 0                                                                                   | 1868                                                                                | 0                                                                                   | 0                                                                                   | 1787                                                                                | 0                                                                                   |                                                                                     |                                                                                     |                                                                                     |
| Flt Permitted           | 0.719                                                                               |                                                                                     |                                                                                     |                                                                                     | 0.991                                                                               |                                                                                     |                                                                                     | 0.669                                                                               |                                                                                     |                                                                                     | 0.934                                                                               |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Satd. Flow (perm)       | 0                                                                                   | 1336                                                                                |                                                                                     | 0                                                                                   | 1761                                                                                | 0                                                                                   | 0                                                                                   | 1264                                                                                |                                                                                     | 0                                                                                   | 1678                                                                                | 0                                                                                   |                                                                                     |                                                                                     |                                                                                     |
| Right Turn on Red       | Yes                                                                                 |                                                                                     |                                                                                     | Yes                                                                                 |                                                                                     | Yes                                                                                 |                                                                                     | 2                                                                                   |                                                                                     | Yes                                                                                 |                                                                                     | Yes                                                                                 |                                                                                     |                                                                                     |                                                                                     |
| Satd. Flow (RTOR)       | 8                                                                                   |                                                                                     |                                                                                     |                                                                                     | 31                                                                                  |                                                                                     |                                                                                     | 2                                                                                   |                                                                                     |                                                                                     | 31                                                                                  |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Link Speed (mph)        | 30                                                                                  |                                                                                     |                                                                                     |                                                                                     | 30                                                                                  |                                                                                     |                                                                                     | 30                                                                                  |                                                                                     |                                                                                     | 30                                                                                  |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Link Distance (ft)      | 764                                                                                 |                                                                                     |                                                                                     |                                                                                     | 972                                                                                 |                                                                                     |                                                                                     | 2055                                                                                |                                                                                     |                                                                                     | 1553                                                                                |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Travel Time (s)         | 17.4                                                                                |                                                                                     |                                                                                     |                                                                                     | 22.1                                                                                |                                                                                     |                                                                                     | 46.7                                                                                |                                                                                     |                                                                                     | 35.3                                                                                |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Confl. Peds. (#/hr)     | 6                                                                                   |                                                                                     |                                                                                     | 4                                                                                   | 4                                                                                   |                                                                                     | 6                                                                                   |                                                                                     | 2                                                                                   |                                                                                     | 2                                                                                   |                                                                                     | 6                                                                                   |                                                                                     |                                                                                     |
| Confl. Bikes (#/hr)     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     | 4                                                                                   |                                                                                     |                                                                                     | 2                                                                                   |                                                                                     |                                                                                     |                                                                                     | 1                                                                                   |                                                                                     |                                                                                     |
| Peak Hour Factor        | 0.92                                                                                | 0.92                                                                                | 0.92                                                                                | 0.92                                                                                | 0.92                                                                                | 0.92                                                                                | 0.92                                                                                | 0.92                                                                                | 0.92                                                                                | 0.92                                                                                | 0.92                                                                                | 0.92                                                                                |                                                                                     |                                                                                     |                                                                                     |
| Heavy Vehicles (%)      | 0%                                                                                  | 0%                                                                                  | 0%                                                                                  | 1%                                                                                  | 1%                                                                                  | 1%                                                                                  | 0%                                                                                  | 0%                                                                                  | 0%                                                                                  | 0%                                                                                  | 0%                                                                                  | 0%                                                                                  |                                                                                     |                                                                                     |                                                                                     |
| Shared Lane Traffic (%) |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Lane Group Flow (vph)   | 0                                                                                   | 418                                                                                 | 0                                                                                   | 0                                                                                   | 212                                                                                 | 0                                                                                   | 0                                                                                   | 370                                                                                 | 0                                                                                   | 0                                                                                   | 631                                                                                 | 0                                                                                   |                                                                                     |                                                                                     |                                                                                     |
| Turn Type               | Perm                                                                                | NA                                                                                  |                                                                                     | Perm                                                                                | NA                                                                                  |                                                                                     | Perm                                                                                | NA                                                                                  |                                                                                     | Perm                                                                                | NA                                                                                  |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Protected Phases        | 1                                                                                   |                                                                                     |                                                                                     |                                                                                     | 1                                                                                   |                                                                                     |                                                                                     | 2                                                                                   |                                                                                     |                                                                                     | 2                                                                                   |                                                                                     | 3                                                                                   |                                                                                     |                                                                                     |
| Permitted Phases        | 1                                                                                   |                                                                                     |                                                                                     |                                                                                     | 1                                                                                   |                                                                                     |                                                                                     | 2                                                                                   |                                                                                     |                                                                                     | 2                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Detector Phase          | 1                                                                                   |                                                                                     | 1                                                                                   |                                                                                     | 1                                                                                   | 1                                                                                   |                                                                                     | 2                                                                                   | 2                                                                                   |                                                                                     | 2                                                                                   | 2                                                                                   |                                                                                     |                                                                                     |                                                                                     |
| Switch Phase            |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Minimum Initial (s)     | 6.0                                                                                 | 6.0                                                                                 |                                                                                     | 6.0                                                                                 | 6.0                                                                                 |                                                                                     | 6.0                                                                                 | 6.0                                                                                 |                                                                                     | 6.0                                                                                 | 6.0                                                                                 |                                                                                     | 4.0                                                                                 |                                                                                     |                                                                                     |
| Minimum Split (s)       | 11.0                                                                                | 11.0                                                                                |                                                                                     | 11.0                                                                                | 11.0                                                                                |                                                                                     | 11.0                                                                                | 11.0                                                                                |                                                                                     | 11.0                                                                                | 11.0                                                                                |                                                                                     | 19.0                                                                                |                                                                                     |                                                                                     |
| Total Split (s)         | 35.0                                                                                | 35.0                                                                                |                                                                                     | 35.0                                                                                | 35.0                                                                                |                                                                                     | 35.0                                                                                | 35.0                                                                                |                                                                                     | 35.0                                                                                | 35.0                                                                                |                                                                                     | 19.0                                                                                |                                                                                     |                                                                                     |
| Total Split (%)         | 39.3%                                                                               | 39.3%                                                                               |                                                                                     | 39.3%                                                                               | 39.3%                                                                               |                                                                                     | 39.3%                                                                               | 39.3%                                                                               |                                                                                     | 39.3%                                                                               | 39.3%                                                                               |                                                                                     | 21%                                                                                 |                                                                                     |                                                                                     |
| Yellow Time (s)         | 3.0                                                                                 | 3.0                                                                                 |                                                                                     | 3.0                                                                                 | 3.0                                                                                 |                                                                                     | 3.0                                                                                 | 3.0                                                                                 |                                                                                     | 3.0                                                                                 | 3.0                                                                                 |                                                                                     | 3.0                                                                                 |                                                                                     |                                                                                     |
| All-Red Time (s)        | 2.0                                                                                 | 2.0                                                                                 |                                                                                     | 2.0                                                                                 | 2.0                                                                                 |                                                                                     | 2.0                                                                                 | 2.0                                                                                 |                                                                                     | 2.0                                                                                 | 2.0                                                                                 |                                                                                     | 1.0                                                                                 |                                                                                     |                                                                                     |
| Lost Time Adjust (s)    | 0.0                                                                                 |                                                                                     |                                                                                     | 0.0                                                                                 |                                                                                     |                                                                                     | 0.0                                                                                 |                                                                                     |                                                                                     | 0.0                                                                                 |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Total Lost Time (s)     | 5.0                                                                                 |                                                                                     |                                                                                     | 5.0                                                                                 |                                                                                     |                                                                                     | 5.0                                                                                 |                                                                                     |                                                                                     | 5.0                                                                                 |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Lead/Lag                | Lead                                                                                | Lead                                                                                |                                                                                     | Lead                                                                                | Lead                                                                                |                                                                                     | Lag                                                                                 | Lag                                                                                 |                                                                                     | Lag                                                                                 | Lag                                                                                 |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Lead-Lag Optimize?      |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Recall Mode             | None                                                                                | None                                                                                |                                                                                     | None                                                                                | None                                                                                |                                                                                     | None                                                                                | None                                                                                |                                                                                     | None                                                                                | None                                                                                |                                                                                     | None                                                                                |                                                                                     |                                                                                     |
| Act Effct Green (s)     | 28.3                                                                                |                                                                                     |                                                                                     | 28.3                                                                                |                                                                                     |                                                                                     | 30.7                                                                                |                                                                                     |                                                                                     | 30.7                                                                                |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Actuated g/C Ratio      | 0.37                                                                                |                                                                                     |                                                                                     | 0.37                                                                                |                                                                                     |                                                                                     | 0.41                                                                                |                                                                                     |                                                                                     | 0.41                                                                                |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| v/c Ratio               | 0.83                                                                                |                                                                                     |                                                                                     | 0.31                                                                                |                                                                                     |                                                                                     | 0.72                                                                                |                                                                                     |                                                                                     | 0.90                                                                                |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Control Delay           | 39.5                                                                                |                                                                                     |                                                                                     | 17.4                                                                                |                                                                                     |                                                                                     | 32.4                                                                                |                                                                                     |                                                                                     | 42.4                                                                                |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Queue Delay             | 0.0                                                                                 |                                                                                     |                                                                                     | 0.0                                                                                 |                                                                                     |                                                                                     | 0.0                                                                                 |                                                                                     |                                                                                     | 0.0                                                                                 |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Total Delay             | 39.5                                                                                |                                                                                     |                                                                                     | 17.4                                                                                |                                                                                     |                                                                                     | 32.4                                                                                |                                                                                     |                                                                                     | 42.4                                                                                |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| LOS                     | D                                                                                   |                                                                                     |                                                                                     | B                                                                                   |                                                                                     |                                                                                     | C                                                                                   |                                                                                     |                                                                                     | D                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Approach Delay          | 39.5                                                                                |                                                                                     |                                                                                     | 17.4                                                                                |                                                                                     |                                                                                     | 32.4                                                                                |                                                                                     |                                                                                     | 42.4                                                                                |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Approach LOS            | D                                                                                   |                                                                                     |                                                                                     | B                                                                                   |                                                                                     |                                                                                     | C                                                                                   |                                                                                     |                                                                                     | D                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Queue Length 50th (ft)  | 140                                                                                 |                                                                                     |                                                                                     | 48                                                                                  |                                                                                     |                                                                                     | 123                                                                                 |                                                                                     |                                                                                     | 225                                                                                 |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Queue Length 95th (ft)  | #403                                                                                |                                                                                     |                                                                                     | 133                                                                                 |                                                                                     |                                                                                     | #356                                                                                |                                                                                     |                                                                                     | #598                                                                                |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Internal Link Dist (ft) | 684                                                                                 |                                                                                     |                                                                                     | 892                                                                                 |                                                                                     |                                                                                     | 1975                                                                                |                                                                                     |                                                                                     | 1473                                                                                |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Turn Bay Length (ft)    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Base Capacity (vph)     | 546                                                                                 |                                                                                     |                                                                                     | 732                                                                                 |                                                                                     |                                                                                     | 513                                                                                 |                                                                                     |                                                                                     | 698                                                                                 |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Starvation Cap Reductn  | 0                                                                                   |                                                                                     |                                                                                     | 0                                                                                   |                                                                                     |                                                                                     | 0                                                                                   |                                                                                     |                                                                                     | 0                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Spillback Cap Reductn   | 0                                                                                   |                                                                                     |                                                                                     | 0                                                                                   |                                                                                     |                                                                                     | 0                                                                                   |                                                                                     |                                                                                     | 0                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Storage Cap Reductn     | 0                                                                                   |                                                                                     |                                                                                     | 0                                                                                   |                                                                                     |                                                                                     | 0                                                                                   |                                                                                     |                                                                                     | 0                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Reduced v/c Ratio       | 0.77                                                                                |                                                                                     |                                                                                     | 0.29                                                                                |                                                                                     |                                                                                     | 0.72                                                                                |                                                                                     |                                                                                     | 0.90                                                                                |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |

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| Intersection Summary               |                                                               |
|------------------------------------|---------------------------------------------------------------|
| Area Type:                         | Other                                                         |
| Cycle Length:                      | 96                                                            |
| Actuated Cycle Length:             | 56.5                                                          |
| Natural Cycle:                     | 65                                                            |
| Control Type:                      | Actuated-Uncoordinated                                        |
| Maximum v/c Ratio:                 | 0.70                                                          |
| Intersection Signal Delay:         | 13.5                                                          |
| Intersection Capacity Utilization: | 70.6%                                                         |
| Analysis Period (min):             | 15                                                            |
| #                                  | 95th percentile volume exceeds capacity, queue may be longer. |
|                                    | Queue shown is maximum after two cycles.                      |

Lanes, Volumes, Timings \vhb\proj\Wat-LD\12239.00\tech\Traffic\Synchro\TIA\_2018\2025 BD\_SAT\_AGGRESSIVE.syn  
VHB/MSD 07/03/2018

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| Major/Minor          | Minor1 | Major1 | Major2 |   |      |   |
|----------------------|--------|--------|--------|---|------|---|
| Conflicting Flow All | 1068   | 418    | 0      | 0 | 452  | 0 |
| Stage 1              | 416    | -      | -      | - | -    | - |
| Stage 2              | 652    | -      | -      | - | -    | - |
| Critical Hdwy        | 6.4    | 6.2    | -      | - | 4.1  | - |
| Critical Hdwy Stg 1  | 5.4    | -      | -      | - | -    | - |
| Critical Hdwy Stg 2  | 5.4    | -      | -      | - | -    | - |
| Follow-up Hdwy       | 3.5    | 3.3    | -      | - | 2.2  | - |
| Port Cap-1 Maneuver  | 248    | 639    | -      | - | 1119 | - |
| Stage 1              | 670    | -      | -      | - | -    | - |
| Stage 2              | 522    | -      | -      | - | -    | - |
| Platoon blocked, %   |        |        | -      | - | -    | - |
| Mov Cap-1 Maneuver   | 225    | 635    | -      | - | 1117 | - |
| Stage 1              | 225    | -      | -      | - | -    | - |
| Stage 2              | 667    | -      | -      | - | -    | - |
| Stage 2              | 476    | -      | -      | - | -    | - |

| Minor Lane/Major Mvmt | NBT | NBR | WBLn1 | SBL   | SBT |
|-----------------------|-----|-----|-------|-------|-----|
| Capacity (veh/h)      | -   | -   | 321   | 1117  | -   |
| HCM Lane V/C Ratio    | -   | -   | 0.44  | 0.063 | -   |
| HCM Control Delay (s) | -   | -   | 24.7  | 8.4   | 0   |
| HCM Lane LOS          | -   | -   | C     | A     | A   |
| HCM 95th %ile Q (veh) | -   | -   | 2.2   | 0.2   | -   |

12239.00 :: Needham Street  
6: Needham Street & Oak Street/Christina Street

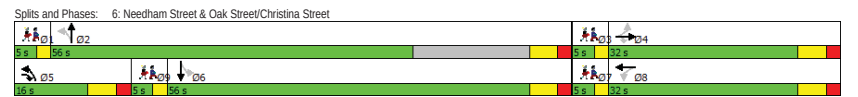
2025 Build Conditions with Shuttle Service  
Timing Plan: Saturday Midday

| Lane Group              | EBL   | EBT   | EBR   | WBL   | WBT   | WBR  | NBL   | NBT   | NBR  | SBL   | SBT   | SBR  | Ø1   | Ø3   | Ø7   | Ø9   |
|-------------------------|-------|-------|-------|-------|-------|------|-------|-------|------|-------|-------|------|------|------|------|------|
| Lane Configurations     |       | ↔     | ↔     | ↔     | ↔     | ↔    | ↔     | ↔     | ↔    | ↔     | ↔     | ↔    |      |      |      |      |
| Traffic Volume (vph)    | 255   | 80    | 195   | 130   | 100   | 70   | 155   | 755   | 55   | 40    | 825   | 155  |      |      |      |      |
| Future Volume (vph)     | 255   | 80    | 195   | 130   | 100   | 70   | 155   | 755   | 55   | 40    | 825   | 155  |      |      |      |      |
| Ideal Flow (vphpl)      | 1900  | 1900  | 1900  | 1900  | 1900  | 1900 | 1900  | 1900  | 1900 | 1900  | 1900  | 1900 |      |      |      |      |
| Storage Length (ft)     | 0     |       | 100   | 200   |       | 50   | 0     |       |      | 0     | 220   |      |      |      |      |      |
| Storage Lanes           | 0     |       | 1     |       |       | 0    |       |       |      | 0     | 1     |      |      |      |      |      |
| Taper Length (ft)       | 25    |       |       | 25    |       |      | 25    |       |      | 25    |       |      |      |      |      |      |
| Satd. Flow (prot)       | 0     | 1830  | 1615  | 1805  | 1758  | 0    | 1805  | 1877  | 0    | 1787  | 1830  | 0    |      |      |      |      |
| Flt Permitted           |       | 0.523 |       | 0.303 |       |      | 0.069 |       |      | 0.191 |       |      |      |      |      |      |
| Satd. Flow (perm)       | 0     | 987   | 1615  | 576   | 1758  | 0    | 131   | 1877  | 0    | 359   | 1830  | 0    |      |      |      |      |
| Right Turn on Red       |       |       | Yes   |       |       | Yes  |       |       | Yes  |       |       | Yes  |      |      |      |      |
| Satd. Flow (RTOR)       |       |       | 146   |       | 29    |      |       | 5     |      |       | 11    |      |      |      |      |      |
| Link Speed (mph)        |       | 30    |       |       | 30    |      |       | 30    |      |       | 30    |      |      |      |      |      |
| Link Distance (ft)      |       | 1238  |       |       | 516   |      |       | 754   |      |       | 356   |      |      |      |      |      |
| Travel Time (s)         |       | 28.1  |       |       | 11.7  |      |       | 17.1  |      |       | 8.1   |      |      |      |      |      |
| Confl. Peds. (#/hr)     | 3     |       |       |       |       | 3    |       |       | 3    | 3     |       |      |      |      |      |      |
| Confl. Bikes (#/hr)     |       |       |       |       |       |      |       | 1     |      |       |       | 1    |      |      |      |      |
| Peak Hour Factor        | 0.92  | 0.92  | 0.92  | 0.92  | 0.92  | 0.92 | 0.92  | 0.92  | 0.92 | 0.92  | 0.92  | 0.92 |      |      |      |      |
| Heavy Vehicles (%)      | 0%    | 0%    | 0%    | 0%    | 0%    | 0%   | 0%    | 0%    | 0%   | 1%    | 1%    | 1%   |      |      |      |      |
| Shared Lane Traffic (%) |       |       |       |       |       |      |       |       |      |       |       |      |      |      |      |      |
| Lane Group Flow (vph)   | 0     | 364   | 212   | 141   | 185   | 0    | 168   | 881   | 0    | 43    | 1065  | 0    |      |      |      |      |
| Turn Type               | Perm  | NA    | pm+ov | Perm  | NA    |      | pm+pt | NA    |      | Perm  | NA    |      |      |      |      |      |
| Protected Phases        |       | 4     | 5     |       | 8     |      | 5     | 2     |      | 6     |       |      | 1    | 3    | 7    | 9    |
| Permitted Phases        | 4     |       | 4     | 8     |       |      | 2     |       |      | 6     |       |      |      |      |      |      |
| Detector Phase          | 4     | 4     | 5     | 8     | 8     |      | 5     | 2     |      | 6     | 6     |      |      |      |      |      |
| Switch Phase            |       |       |       |       |       |      |       |       |      |       |       |      |      |      |      |      |
| Minimum Initial (s)     | 6.0   | 6.0   | 6.0   | 6.0   | 6.0   |      | 6.0   | 15.0  |      | 15.0  | 15.0  |      | 3.0  | 3.0  | 3.0  | 3.0  |
| Minimum Split (s)       | 22.0  | 22.0  | 13.0  | 26.0  | 26.0  |      | 13.0  | 29.0  |      | 28.0  | 28.0  |      | 5.0  | 5.0  | 5.0  | 5.0  |
| Total Split (s)         | 32.0  | 32.0  | 16.0  | 32.0  | 32.0  |      | 16.0  | 56.0  |      | 56.0  | 56.0  |      | 5.0  | 5.0  | 5.0  | 5.0  |
| Total Split (%)         | 28.1% | 28.1% | 14.0% | 28.1% | 28.1% |      | 14.0% | 49.1% |      | 49.1% | 49.1% |      | 4%   | 4%   | 4%   | 4%   |
| Yellow Time (s)         | 4.0   | 4.0   | 4.0   | 4.0   | 4.0   |      | 4.0   | 4.0   |      | 4.0   | 4.0   |      | 2.0  | 2.0  | 2.0  | 2.0  |
| All-Red Time (s)        | 2.0   | 2.0   | 2.0   | 2.0   | 2.0   |      | 2.0   | 2.0   |      | 2.0   | 2.0   |      | 0.0  | 0.0  | 0.0  | 0.0  |
| Lost Time Adjust (s)    |       | 0.0   | 0.0   | 0.0   | 0.0   |      | 0.0   | 0.0   |      | 0.0   | 0.0   |      |      |      |      |      |
| Total Lost Time (s)     |       | 6.0   | 6.0   | 6.0   | 6.0   |      | 6.0   | 6.0   |      | 6.0   | 6.0   |      |      |      |      |      |
| Lead/Lag                | Lag   | Lag   | Lead  | Lag   | Lag   |      | Lead  | Lag   |      | 6.0   | 6.0   |      | Lead | Lead | Lead | Lag  |
| Lead-Lag Optimize?      |       |       |       |       |       |      |       |       |      |       |       |      |      |      |      |      |
| Recall Mode             | None  | None  | None  | None  | None  |      | None  | None  |      | None  | None  |      | None | None | None | None |
| Act Effect Green (s)    | 27.0  | 42.6  | 26.0  | 26.0  |       |      | 65.6  | 64.7  |      | 50.0  | 50.0  |      |      |      |      |      |
| Actuated g/C Ratio      |       | 0.26  | 0.41  | 0.25  | 0.25  |      | 0.63  | 0.62  |      | 0.48  | 0.48  |      |      |      |      |      |
| v/c Ratio               |       | 1.43  | 0.28  | 0.99  | 0.40  |      | 0.71  | 0.76  |      | 0.25  | 1.21  |      |      |      |      |      |
| Control Delay           |       | 248.2 | 7.9   | 113.7 | 31.0  |      | 37.0  | 20.5  |      | 21.9  | 132.3 |      |      |      |      |      |
| Queue Delay             |       | 0.0   | 0.0   | 0.0   | 0.0   |      | 0.0   | 0.0   |      | 0.0   | 0.0   |      |      |      |      |      |
| Total Delay             |       | 248.2 | 7.9   | 113.7 | 31.0  |      | 37.0  | 20.5  |      | 21.9  | 132.3 |      |      |      |      |      |
| LOS                     |       | F     | A     | F     | C     |      | D     | C     |      | C     | F     |      |      |      |      |      |
| Approach Delay          |       | 159.7 |       |       | 66.8  |      |       | 23.1  |      |       | 128.0 |      |      |      |      |      |
| Approach LOS            |       | F     |       |       | E     |      |       | C     |      |       | F     |      |      |      |      |      |
| Queue Length 50th (ft)  |       | ~334  | 27    | 93    | 86    |      | 57    | 367   |      | 16    | ~866  |      |      |      |      |      |
| Queue Length 95th (ft)  |       | #510  | 74    | #232  | 160   |      | #162  | 686   |      | 48    | #1194 |      |      |      |      |      |
| Internal Link Dist (ft) |       | 1158  |       |       | 436   |      |       | 674   |      |       | 276   |      |      |      |      |      |
| Turn Bay Length (ft)    |       |       | 100   | 200   |       |      |       |       |      | 220   |       |      |      |      |      |      |
| Base Capacity (vph)     |       | 254   | 749   | 143   | 458   |      | 242   | 1186  |      | 171   | 880   |      |      |      |      |      |
| Starvation Cap Reductn  |       | 0     | 0     | 0     | 0     |      | 0     | 0     |      | 0     | 0     |      |      |      |      |      |
| Spillback Cap Reductn   |       | 0     | 0     | 0     | 0     |      | 0     | 0     |      | 0     | 0     |      |      |      |      |      |
| Storage Cap Reductn     |       | 0     | 0     | 0     | 0     |      | 0     | 0     |      | 0     | 0     |      |      |      |      |      |
| Reduced v/c Ratio       |       | 1.43  | 0.28  | 0.99  | 0.40  |      | 0.69  | 0.74  |      | 0.25  | 1.21  |      |      |      |      |      |

| Intersection Summary                                            |                        |
|-----------------------------------------------------------------|------------------------|
| Area Type:                                                      | Other                  |
| Cycle Length: 114                                               |                        |
| Actuated Cycle Length: 104.6                                    |                        |
| Natural Cycle: 150                                              |                        |
| Control Type: Actuated-Uncoordinated                            |                        |
| Maximum v/c Ratio: 1.43                                         |                        |
| Intersection Signal Delay: 91.5                                 | Intersection LOS: F    |
| Intersection Capacity Utilization 109.5%                        | ICU Level of Service H |
| Analysis Period (min) 15                                        |                        |
| - Volume exceeds capacity, queue is theoretically infinite.     |                        |
| Queue shown is maximum after two cycles.                        |                        |
| # 95th percentile volume exceeds capacity, queue may be longer. |                        |
| Queue shown is maximum after two cycles.                        |                        |

12239.00 :: Needham Street  
6: Needham Street & Oak Street/Christina Street

2025 Build Conditions with Shuttle Service  
Timing Plan: Saturday Midday



12239.00 :: Needham Street  
7: Needham Street & South Site Driveway

2025 Build Conditions with Shuttle Service  
Timing Plan: Saturday MIDDAY

| Intersection             |        |       |        |      |      |      |
|--------------------------|--------|-------|--------|------|------|------|
| Int Delay, s/veh         | 14.8   |       |        |      |      |      |
| Movement                 | EBL    | EBR   | NBL    | NBT  | SBT  | SBR  |
| Lane Configurations      | ↔      |       | ↔      | ↑    | ↓    |      |
| Traffic Vol, veh/h       | 20     | 160   | 110    | 970  | 860  | 65   |
| Future Vol, veh/h        | 20     | 160   | 110    | 970  | 860  | 65   |
| Conflicting Peds, #/hr   | 0      | 0     | 8      | 0    | 0    | 8    |
| Sign Control             | Stop   | Stop  | Free   | Free | Free | Free |
| RT Channelized           | -      | None  | -      | None | -    | None |
| Storage Length           | 0      | -     | 50     | -    | -    | -    |
| Veh in Median Storage, # | 0      | -     | -      | 0    | 0    | -    |
| Grade, %                 | 0      | -     | -      | 0    | 0    | -    |
| Peak Hour Factor         | 92     | 92    | 92     | 92   | 92   | 92   |
| Heavy Vehicles, %        | 0      | 0     | 0      | 0    | 1    | 1    |
| Mvmt Flow                | 22     | 174   | 120    | 1054 | 935  | 71   |
| Major/Minor              |        |       |        |      |      |      |
| Minor2                   | Major1 |       | Major2 |      |      |      |
| Conflicting Flow All     | 2271   | 978   | 1013   | 0    | -    | 0    |
| Stage 1                  | 978    | -     | -      | -    | -    | -    |
| Stage 2                  | 1293   | -     | -      | -    | -    | -    |
| Critical Hdwy            | 6.4    | 6.2   | 4.1    | -    | -    | -    |
| Critical Hdwy Stg 1      | 5.4    | -     | -      | -    | -    | -    |
| Critical Hdwy Stg 2      | 5.4    | -     | -      | -    | -    | -    |
| Follow-up Hdwy           | 3.5    | 3.3   | 2.2    | -    | -    | -    |
| Pot Cap-1 Maneuver       | 45     | 307   | 692    | -    | -    | -    |
| Stage 1                  | 368    | -     | -      | -    | -    | -    |
| Stage 2                  | 260    | -     | -      | -    | -    | -    |
| Platoon blocked, %       |        |       |        | -    | -    | -    |
| Mov Cap-1 Maneuver       | 37     | 305   | 692    | -    | -    | -    |
| Mov Cap-2 Maneuver       | 37     | -     | -      | -    | -    | -    |
| Stage 1                  | 366    | -     | -      | -    | -    | -    |
| Stage 2                  | 213    | -     | -      | -    | -    | -    |
| Approach                 |        |       |        |      |      |      |
| EB                       | NB     |       | SB     |      |      |      |
| HCM Control Delay, s     | 172.9  | 1.1   | 0      |      |      |      |
| HCM LOS                  | F      |       |        |      |      |      |
| Minor Lane/Major Mvmt    |        |       |        |      |      |      |
| NBL                      | NBT    | EBLn1 | SBT    | SBR  |      |      |
| Capacity (veh/h)         | 692    | -     | 169    | -    | -    |      |
| HCM Lane V/C Ratio       | 0.173  | -     | 1.158  | -    | -    |      |
| HCM Control Delay (s)    | 11.3   | -     | 172.9  | -    | -    |      |
| HCM Lane LOS             | B      | -     | F      | -    | -    |      |
| HCM 95th %ile Q(veh)     | 0.6    | -     | 10.4   | -    | -    |      |

12239.00 :: Needham Street  
8: Needham Street & TJMaxx Driveway

2025 Build Conditions with Shuttle Service  
Timing Plan: Saturday MIDDAY

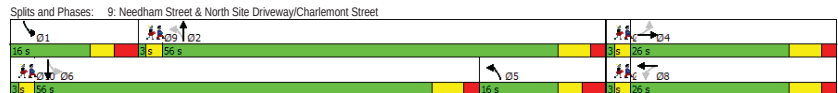
| Intersection             |        |       |        |       |       |      |
|--------------------------|--------|-------|--------|-------|-------|------|
| Int Delay, s/veh         | 0.2    |       |        |       |       |      |
| Movement                 | WBL    | WBR   | NBT    | NBR   | SBL   | SBT  |
| Lane Configurations      |        | ↔     | ↔      |       | ↔     | ↑    |
| Traffic Vol, veh/h       | 5      | 10    | 975    | 10    | 10    | 920  |
| Future Vol, veh/h        | 5      | 10    | 975    | 10    | 10    | 920  |
| Conflicting Peds, #/hr   | 0      | 1     | 0      | 7     | 7     | 0    |
| Sign Control             | Stop   | Stop  | Free   | Free  | Free  | Free |
| RT Channelized           | -      | None  | -      | None  | -     | None |
| Storage Length           | -      | 0     | -      | -     | 80    | -    |
| Veh in Median Storage, # | 0      | -     | 0      | -     | -     | 0    |
| Grade, %                 | 0      | -     | 0      | -     | -     | 0    |
| Peak Hour Factor         | 92     | 92    | 92     | 92    | 92    | 92   |
| Heavy Vehicles, %        | 0      | 0     | 0      | 0     | 1     | 1    |
| Mvmt Flow                | 5      | 11    | 1060   | 11    | 11    | 1000 |
| Major/Minor              |        |       |        |       |       |      |
| Minor1                   | Major1 |       | Major2 |       |       |      |
| Conflicting Flow All     | 2094   | 1073  | 0      | 0     | 1078  | 0    |
| Stage 1                  | 1072   | -     | -      | -     | -     | -    |
| Stage 2                  | 1022   | -     | -      | -     | -     | -    |
| Critical Hdwy            | 6.4    | 6.2   | -      | -     | 4.11  | -    |
| Critical Hdwy Stg 1      | 5.4    | -     | -      | -     | -     | -    |
| Critical Hdwy Stg 2      | 5.4    | -     | -      | -     | -     | -    |
| Follow-up Hdwy           | 3.5    | 3.3   | -      | -     | 2.209 | -    |
| Pot Cap-1 Maneuver       | 58     | 270   | -      | -     | 651   | -    |
| Stage 1                  | 332    | -     | -      | -     | -     | -    |
| Stage 2                  | 350    | -     | -      | -     | -     | -    |
| Platoon blocked, %       |        |       | -      | -     | -     | -    |
| Mov Cap-1 Maneuver       | 57     | 268   | -      | -     | 650   | -    |
| Mov Cap-2 Maneuver       | 57     | -     | -      | -     | -     | -    |
| Stage 1                  | 330    | -     | -      | -     | -     | -    |
| Stage 2                  | 344    | -     | -      | -     | -     | -    |
| Approach                 |        |       |        |       |       |      |
| WB                       | NB     |       | SB     |       |       |      |
| HCM Control Delay, s     | 19     | 0     | 0.1    |       |       |      |
| HCM LOS                  | C      |       |        |       |       |      |
| Minor Lane/Major Mvmt    |        |       |        |       |       |      |
| NBT                      | NBR    | WBLn1 | SBL    | SBT   |       |      |
| Capacity (veh/h)         | -      | -     | 268    | 650   | -     |      |
| HCM Lane V/C Ratio       | -      | -     | 0.041  | 0.017 | -     |      |
| HCM Control Delay (s)    | -      | -     | 19     | 10.6  | -     |      |
| HCM Lane LOS             | -      | -     | C      | B     | -     |      |
| HCM 95th %ile Q(veh)     | -      | -     | 0.1    | 0.1   | -     |      |

12239.00 :: Needham Street  
9: Needham Street & North Site Driveway/Charlemont Street

2025 Build Conditions with Shuttle Service  
Timing Plan: Saturday Midday

| Lane Group              | EBL   | EBT   | EBR  | WBL   | WBT   | WBR  | NBL   | NBT   | NBR  | SBL   | SBT   | SBR  | Ø3   | Ø7   | Ø9   | Ø10  |
|-------------------------|-------|-------|------|-------|-------|------|-------|-------|------|-------|-------|------|------|------|------|------|
| Lane Configurations     | ↰     | ↱     |      | ↰     | ↱     |      | ↰     | ↱     |      | ↰     | ↱     |      |      |      |      |      |
| Traffic Volume (vph)    | 170   | 0     | 95   | 60    | 2     | 35   | 125   | 830   | 30   | 15    | 775   | 140  |      |      |      |      |
| Future Volume (vph)     | 170   | 0     | 95   | 60    | 2     | 35   | 125   | 830   | 30   | 15    | 775   | 140  |      |      |      |      |
| Ideal Flow (vphpl)      | 1900  | 1900  | 1900 | 1900  | 1900  | 1900 | 1900  | 1900  | 1900 | 1900  | 1900  | 1900 |      |      |      |      |
| Storage Length (ft)     | 125   | 0     | 0    | 125   | 0     | 0    | 100   | 0     | 0    | 100   | 0     | 0    |      |      |      |      |
| Storage Lanes           | 1     | 0     | 0    | 1     | 0     | 0    | 1     | 0     | 0    | 1     | 0     | 0    |      |      |      |      |
| Taper Length (ft)       | 25    | 0     | 0    | 25    | 0     | 0    | 25    | 0     | 0    | 25    | 0     | 0    |      |      |      |      |
| Satd. Flow (prot)       | 1805  | 1615  | 0    | 1805  | 1628  | 0    | 1805  | 1887  | 0    | 1787  | 1826  | 0    |      |      |      |      |
| Flt Permitted           | 0.731 |       |      | 0.690 |       |      | 0.082 |       |      | 0.082 |       |      |      |      |      |      |
| Satd. Flow (perm)       | 1389  | 1615  | 0    | 1311  | 1628  | 0    | 156   | 1887  | 0    | 154   | 1826  | 0    |      |      |      |      |
| Right Turn on Red       |       |       | Yes  |       |       | Yes  |       |       | Yes  |       |       | Yes  |      |      |      |      |
| Satd. Flow (RTOR)       |       | 322   |      |       | 38    |      |       | 2     |      |       | 12    |      |      |      |      |      |
| Link Speed (mph)        |       | 30    |      |       | 30    |      |       | 30    |      |       | 30    |      |      |      |      |      |
| Link Distance (ft)      |       | 491   |      |       | 556   |      |       | 244   |      |       | 497   |      |      |      |      |      |
| Travel Time (s)         |       | 11.2  |      |       | 12.6  |      |       | 5.5   |      |       | 11.3  |      |      |      |      |      |
| Confl. Peds. (#/hr)     |       |       |      |       |       |      | 7     |       | 8    | 8     |       | 7    |      |      |      |      |
| Confl. Bikes (#/hr)     |       |       |      |       |       |      |       | 2     |      |       |       | 1    |      |      |      |      |
| Peak Hour Factor        | 0.92  | 0.92  | 0.92 | 0.92  | 0.92  | 0.92 | 0.92  | 0.92  | 0.92 | 0.92  | 0.92  | 0.92 |      |      |      |      |
| Heavy Vehicles (%)      | 0%    | 0%    | 0%   | 0%    | 0%    | 0%   | 0%    | 0%    | 0%   | 1%    | 1%    | 1%   |      |      |      |      |
| Shared Lane Traffic (%) |       |       |      |       |       |      |       |       |      |       |       |      |      |      |      |      |
| Lane Group Flow (vph)   | 185   | 103   | 0    | 65    | 40    | 0    | 136   | 935   | 0    | 16    | 994   | 0    |      |      |      |      |
| Turn Type               | Perm  | NA    |      | Perm  | NA    |      | pm+pt | NA    |      | pm+pt | NA    |      |      |      |      |      |
| Protected Phases        |       | 4     |      |       | 8     |      | 5     | 2     |      | 1     | 6     |      | 3    | 7    | 9    | 10   |
| Permitted Phases        |       | 4     |      |       | 8     |      | 2     |       |      | 6     |       |      |      |      |      |      |
| Detector Phase          |       | 4     | 4    |       | 8     | 8    |       | 5     | 2    |       | 1     | 6    |      |      |      |      |
| Switch Phase            |       |       |      |       |       |      |       |       |      |       |       |      |      |      |      |      |
| Minimum Initial (s)     | 3.0   | 3.0   |      | 3.0   | 3.0   |      | 3.0   | 3.0   |      | 3.0   | 3.0   |      | 1.0  | 1.0  | 1.0  | 1.0  |
| Minimum Split (s)       | 23.0  | 23.0  |      | 23.0  | 23.0  |      | 9.0   | 22.0  |      | 9.0   | 22.0  |      | 3.0  | 3.0  | 3.0  | 3.0  |
| Total Split (s)         | 26.0  | 26.0  |      | 26.0  | 26.0  |      | 16.0  | 56.0  |      | 16.0  | 56.0  |      | 3.0  | 3.0  | 3.0  | 3.0  |
| Total Split (%)         | 25.0% | 25.0% |      | 25.0% | 25.0% |      | 15.4% | 53.8% |      | 15.4% | 53.8% |      | 3%   | 3%   | 3%   | 3%   |
| Yellow Time (s)         | 4.0   | 4.0   |      | 4.0   | 4.0   |      | 3.0   | 4.0   |      | 3.0   | 4.0   |      | 2.0  | 2.0  | 2.0  | 2.0  |
| All-Red Time (s)        | 2.0   | 2.0   |      | 2.0   | 2.0   |      | 3.0   | 2.0   |      | 3.0   | 2.0   |      | 0.0  | 0.0  | 0.0  | 0.0  |
| Lost Time Adjust (s)    | 0.0   | 0.0   |      | 0.0   | 0.0   |      | 0.0   | 0.0   |      | 0.0   | 0.0   |      |      |      |      |      |
| Total Lost Time (s)     | 6.0   | 6.0   |      | 6.0   | 6.0   |      | 6.0   | 6.0   |      | 6.0   | 6.0   |      |      |      |      |      |
| Lead/Lag                | Lag   | Lag   |      | Lag   | Lag   |      |       |       | Lead | Lag   |       |      | Lead | Lead | Lag  | Lead |
| Lead-Lag Optimize?      |       |       |      |       |       |      |       |       |      |       |       |      |      |      |      |      |
| Recall Mode             | None  | None  |      | None  | None  |      | None  | Min   |      | None  | Min   |      | None | None | None | None |
| Act Effect Green (s)    | 15.8  | 15.8  |      | 15.8  | 15.8  |      | 59.0  | 59.0  |      | 51.0  | 50.5  |      |      |      |      |      |
| Actuated g/C Ratio      | 0.17  | 0.17  |      | 0.17  | 0.17  |      | 0.64  | 0.64  |      | 0.56  | 0.55  |      |      |      |      |      |
| v/c Ratio               | 0.77  | 0.19  |      | 0.29  | 0.13  |      | 0.62  | 0.77  |      | 0.09  | 0.98  |      |      |      |      |      |
| Control Delay           | 58.3  | 0.8   |      | 36.8  | 12.5  |      | 38.5  | 20.2  |      | 12.2  | 47.6  |      |      |      |      |      |
| Queue Delay             | 0.0   | 0.0   |      | 0.0   | 0.0   |      | 0.0   | 0.0   |      | 0.0   | 0.0   |      |      |      |      |      |
| Total Delay             | 58.3  | 0.8   |      | 36.8  | 12.5  |      | 38.5  | 20.2  |      | 12.2  | 47.6  |      |      |      |      |      |
| LOS                     | E     | A     |      | D     | B     |      | D     | C     |      | B     | D     |      |      |      |      |      |
| Approach Delay          |       | 37.7  |      |       | 27.6  |      |       | 22.5  |      |       | 47.0  |      |      |      |      |      |
| Approach LOS            |       | D     |      |       | C     |      |       | C     |      |       | D     |      |      |      |      |      |
| Queue Length 50th (ft)  | 101   | 0     |      | 32    | 1     |      | 23    | 295   |      | 4     | 522   |      |      |      |      |      |
| Queue Length 95th (ft)  | #201  | 0     |      | 75    | 29    |      | 98    | #817  |      | 15    | #972  |      |      |      |      |      |
| Internal Link Dist (ft) |       | 411   |      |       | 476   |      |       | 164   |      |       | 417   |      |      |      |      |      |
| Turn Bay Length (ft)    | 125   |       |      | 125   |       |      | 100   |       |      | 100   |       |      |      |      |      |      |
| Base Capacity (vph)     | 304   | 605   |      | 287   | 386   |      | 286   | 1214  |      | 264   | 1010  |      |      |      |      |      |
| Starvation Cap Reductn  | 0     | 0     |      | 0     | 0     |      | 0     | 0     |      | 0     | 0     |      |      |      |      |      |
| Spillback Cap Reductn   | 0     | 0     |      | 0     | 0     |      | 0     | 0     |      | 0     | 0     |      |      |      |      |      |
| Storage Cap Reductn     | 0     | 0     |      | 0     | 0     |      | 0     | 0     |      | 0     | 0     |      |      |      |      |      |
| Reduced v/c Ratio       | 0.61  | 0.17  |      | 0.23  | 0.10  |      | 0.48  | 0.77  |      | 0.06  | 0.98  |      |      |      |      |      |

| Intersection Summary                                            |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|-----------------------------------------------------------------|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|
| Area Type: Other                                                |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Cycle Length: 104                                               |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Actuated Cycle Length: 91.7                                     |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Natural Cycle: 90                                               |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Control Type: Actuated-Uncoordinated                            |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Maximum v/c Ratio: 0.98                                         |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Intersection Signal Delay: 34.5                                 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Intersection Capacity Utilization 87.4%                         |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Analysis Period (min) 15                                        |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| # 95th percentile volume exceeds capacity, queue may be longer. |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Queue shown is maximum after two cycles.                        |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |



12239.00 :: Needham Street  
10: Needham Street & Tower Road/Industrial Place

2025 Build Conditions with Shuttle Service  
Timing Plan: Saturday Midday

| Intersection             |       |      |      |      |      |      |      |      |      |      |      |      |  |  |  |
|--------------------------|-------|------|------|------|------|------|------|------|------|------|------|------|--|--|--|
| Int Delay, s/veh         | 497.1 |      |      |      |      |      |      |      |      |      |      |      |  |  |  |
| Movement                 | EBL   | EBT  | EBR  | WBL  | WBT  | WBR  | NBL  | NBT  | NBR  | SBL  | SBT  | SBR  |  |  |  |
| Lane Configurations      |       | ↰    |      |      | ↰    |      |      | ↰    |      | ↰    | ↱    | ↱    |  |  |  |
| Traffic Vol, veh/h       | 110   | 10   | 85   | 40   | 20   | 55   | 45   | 965  | 20   | 20   | 805  | 80   |  |  |  |
| Future Vol, veh/h        | 110   | 10   | 85   | 40   | 20   | 55   | 45   | 965  | 20   | 20   | 805  | 80   |  |  |  |
| Conflicting Peds, #/hr   | 1     | 0    | 5    | 5    | 0    | 1    | 8    | 0    | 10   | 10   | 0    | 8    |  |  |  |
| Sign Control             | Stop  | Stop | Stop | Stop | Stop | Stop | Free | Free | Free | Free | Free | Free |  |  |  |
| RT Channelized           | -     | -    | None | -    | -    | None | -    | -    | None | -    | -    | None |  |  |  |
| Storage Length           | -     | -    | -    | -    | -    | -    | -    | -    | -    | -    | 100  | -    |  |  |  |
| Veh in Median Storage, # | -     | 0    | -    | -    | 0    | -    | -    | 0    | -    | -    | 0    | -    |  |  |  |
| Grade, %                 | -     | 0    | -    | -    | 0    | -    | -    | 0    | -    | -    | 0    | -    |  |  |  |
| Peak Hour Factor         | 92    | 92   | 92   | 92   | 92   | 92   | 92   | 92   | 92   | 92   | 92   | 92   |  |  |  |
| Heavy Vehicles, %        | 0     | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    |  |  |  |
| Mvmt Flow                | 120   | 11   | 92   | 43   | 22   | 60   | 49   | 1049 | 22   | 22   | 875  | 87   |  |  |  |

| Major/Minor          | Minor2 |      | Minor1 |      | Major1 |      | Major2 |     |
|----------------------|--------|------|--------|------|--------|------|--------|-----|
| Conflicting Flow All | 2169   | 2148 | 931    | 2187 | 2181   | 1071 | 970    | 0   |
| Stage 1              | 970    | 970  | -      | 1168 | 1168   | -    | -      | 0   |
| Stage 2              | 1199   | 1178 | -      | 1019 | 1013   | -    | -      | 0   |
| Critical Hdwy        | 7.1    | 6.5  | 6.2    | 7.1  | 6.5    | 6.2  | 4.1    | 4.1 |
| Critical Hdwy Stg 1  | 6.1    | 5.5  | -      | 6.1  | 5.5    | -    | -      | -   |
| Critical Hdwy Stg 2  | 6.1    | 5.5  | -      | 6.1  | 5.5    | -    | -      | -   |
| Follow-up Hdwy       | 3.5    | 4    | 3.3    | 3.5  | 4      | 3.3  | 2.2    | 2.2 |
| Pot Cap-1 Maneuver   | ~34    | 49   | 326    | ~33  | 47     | 271  | 719    | 653 |
| Stage 1              | 307    | 334  | -      | 238  | 270    | -    | -      | -   |
| Stage 2              | 228    | 267  | -      | 288  | 319    | -    | -      | -   |
| Platoon blocked, %   |        |      |        |      |        |      |        | -   |
| Mov Cap-1 Maneuver   | ~12    | 39   | 322    | ~16  | 37     | 269  | 716    | 652 |
| Mov Cap-2 Maneuver   | ~12    | 39   | -      | ~16  | 37     | -    | -      | -   |
| Stage 1              | 253    | 321  | -      | 196  | 222    | -    | -      | -   |
| Stage 2              | 133    | 220  | -      | 191  | 306    | -    | -      | -   |

| Approach             | EB        | WB        | NB  | SB  |
|----------------------|-----------|-----------|-----|-----|
| HCM Control Delay, s | \$ 4682.9 | \$ 1393.6 | 0.5 | 0.2 |
| HCM LOS              | F         | F         |     |     |

| Minor Lane/Major Mvmt | NBL   | NBT | NBR | EBLn1     | WBLn1     | SBL   | SBT | SBR |
|-----------------------|-------|-----|-----|-----------|-----------|-------|-----|-----|
| Capacity (veh/h)      | 716   | -   | -   | 21        | 35        | 652   | -   | -   |
| HCM Lane V/C Ratio    | 0.068 | -   | -   | 10.611    | 3.571     | 0.033 | -   | -   |
| HCM Control Delay (s) | 10.4  | 0   | -   | \$ 4682.9 | \$ 1393.6 | 10.7  | -   | -   |
| HCM Lane LOS          | B     | A   | -   | F         | F         | B     | -   | -   |
| HCM 95th %ile Q(veh)  | 0.2   | -   | -   | 28.2      | 14.5      | 0.1   | -   | -   |

Notes  
~: Volume exceeds capacity    \$: Delay exceeds 300s    +: Computation Not Defined    \*: All major volume in platoon

12239.00 :: Needham Street  
11: Needham Street & Jaconnet Street

2025 Build Conditions with Shuttle Service  
Timing Plan: Saturday MIDDAY

| Intersection             |        |       |        |       |      |      |
|--------------------------|--------|-------|--------|-------|------|------|
| Int Delay, s/veh         | 3.3    |       |        |       |      |      |
| Movement                 | WBL    | WBR   | NBT    | NBR   | SBL  | SBT  |
| Lane Configurations      | W      |       | R      |       | L    | R    |
| Traffic Vol, veh/h       | 25     | 20    | 1100   | 30    | 20   | 880  |
| Future Vol, veh/h        | 25     | 20    | 1100   | 30    | 20   | 880  |
| Conflicting Peds, #/hr   | 0      | 0     | 0      | 38    | 38   | 0    |
| Sign Control             | Stop   | Stop  | Free   | Free  | Free | Free |
| RT Channelized           | -      | None  | -      | None  | -    | None |
| Storage Length           | 0      | -     | -      | -     | 100  | -    |
| Veh in Median Storage, # | 0      | -     | 0      | -     | -    | 0    |
| Grade, %                 | 0      | -     | 0      | -     | -    | 0    |
| Peak Hour Factor         | 92     | 92    | 92     | 92    | 92   | 92   |
| Heavy Vehicles, %        | 0      | 0     | 0      | 0     | 0    | 0    |
| Mvmt Flow                | 27     | 22    | 1196   | 33    | 22   | 957  |
| Major/Minor              |        |       |        |       |      |      |
| Minor1                   | Major1 |       | Major2 |       |      |      |
| Conflicting Flow All     | 2250   | 1250  | 0      | 0     | 1266 | 0    |
| Stage 1                  | 1250   | -     | -      | -     | -    | -    |
| Stage 2                  | 1000   | -     | -      | -     | -    | -    |
| Critical Hdwy            | 6.4    | 6.2   | -      | -     | 4.1  | -    |
| Critical Hdwy Stg 1      | 5.4    | -     | -      | -     | -    | -    |
| Critical Hdwy Stg 2      | 5.4    | -     | -      | -     | -    | -    |
| Follow-up Hdwy           | 3.5    | 3.3   | -      | -     | 2.2  | -    |
| Pot Cap-1 Maneuver       | 46     | 213   | -      | -     | 556  | -    |
| Stage 1                  | 273    | -     | -      | -     | -    | -    |
| Stage 2                  | 359    | -     | -      | -     | -    | -    |
| Platoon blocked, %       |        |       | -      | -     |      |      |
| Mov Cap-1 Maneuver       | 43     | 206   | -      | -     | 556  | -    |
| Mov Cap-2 Maneuver       | 43     | -     | -      | -     | -    | -    |
| Stage 1                  | 264    | -     | -      | -     | -    | -    |
| Stage 2                  | 345    | -     | -      | -     | -    | -    |
| Approach                 |        |       |        |       |      |      |
| WB                       | NB     |       | SB     |       |      |      |
| HCM Control Delay, s     | 148.2  |       | 0      |       | 0.3  |      |
| HCM LOS                  | F      |       |        |       |      |      |
| Minor Lane/Major Mvmt    |        |       |        |       |      |      |
| NBT                      | NBR    | WBLn1 | SBL    | SBT   |      |      |
| Capacity (veh/h)         | -      | -     | 66     | 556   | -    | -    |
| HCM Lane V/C Ratio       | -      | -     | 0.741  | 0.039 | -    | -    |
| HCM Control Delay (s)    | -      | -     | 148.2  | 11.7  | -    | -    |
| HCM Lane LOS             | -      | -     | F      | B     | -    | -    |
| HCM 95th %ile Q(veh)     | -      | -     | 3.3    | 0.1   | -    | -    |

12239.00 :: Needham Street  
12: Needham Street & Rockland Street

2025 Build Conditions with Shuttle Service  
Timing Plan: Saturday MIDDAY

| Intersection             |        |       |        |       |      |      |
|--------------------------|--------|-------|--------|-------|------|------|
| Int Delay, s/veh         | 1.4    |       |        |       |      |      |
| Movement                 | WBL    | WBR   | NBT    | NBR   | SBL  | SBT  |
| Lane Configurations      | W      |       | R      |       | L    | R    |
| Traffic Vol, veh/h       | 15     | 15    | 1090   | 30    | 20   | 885  |
| Future Vol, veh/h        | 15     | 15    | 1090   | 30    | 20   | 885  |
| Conflicting Peds, #/hr   | 0      | 1     | 0      | 18    | 18   | 0    |
| Sign Control             | Stop   | Stop  | Free   | Free  | Free | Free |
| RT Channelized           | -      | None  | -      | None  | -    | None |
| Storage Length           | 0      | -     | -      | -     | 125  | -    |
| Veh in Median Storage, # | 0      | -     | 0      | -     | -    | 0    |
| Grade, %                 | 0      | -     | 0      | -     | -    | 0    |
| Peak Hour Factor         | 92     | 92    | 92     | 92    | 92   | 92   |
| Heavy Vehicles, %        | 0      | 0     | 0      | 0     | 0    | 0    |
| Mvmt Flow                | 16     | 16    | 1185   | 33    | 22   | 962  |
| Major/Minor              |        |       |        |       |      |      |
| Minor1                   | Major1 |       | Major2 |       |      |      |
| Conflicting Flow All     | 2224   | 1220  | 0      | 0     | 1235 | 0    |
| Stage 1                  | 1219   | -     | -      | -     | -    | -    |
| Stage 2                  | 1005   | -     | -      | -     | -    | -    |
| Critical Hdwy            | 6.4    | 6.2   | -      | -     | 4.1  | -    |
| Critical Hdwy Stg 1      | 5.4    | -     | -      | -     | -    | -    |
| Critical Hdwy Stg 2      | 5.4    | -     | -      | -     | -    | -    |
| Follow-up Hdwy           | 3.5    | 3.3   | -      | -     | 2.2  | -    |
| Pot Cap-1 Maneuver       | 48     | 222   | -      | -     | 571  | -    |
| Stage 1                  | 282    | -     | -      | -     | -    | -    |
| Stage 2                  | 357    | -     | -      | -     | -    | -    |
| Platoon blocked, %       |        |       | -      | -     |      |      |
| Mov Cap-1 Maneuver       | 45     | 218   | -      | -     | 571  | -    |
| Mov Cap-2 Maneuver       | 45     | -     | -      | -     | -    | -    |
| Stage 1                  | 278    | -     | -      | -     | -    | -    |
| Stage 2                  | 343    | -     | -      | -     | -    | -    |
| Approach                 |        |       |        |       |      |      |
| WB                       | NB     |       | SB     |       |      |      |
| HCM Control Delay, s     | 85.7   |       | 0      |       | 0.3  |      |
| HCM LOS                  | F      |       |        |       |      |      |
| Minor Lane/Major Mvmt    |        |       |        |       |      |      |
| NBT                      | NBR    | WBLn1 | SBL    | SBT   |      |      |
| Capacity (veh/h)         | -      | -     | 75     | 571   | -    | -    |
| HCM Lane V/C Ratio       | -      | -     | 0.435  | 0.038 | -    | -    |
| HCM Control Delay (s)    | -      | -     | 85.7   | 11.6  | -    | -    |
| HCM Lane LOS             | -      | -     | F      | B     | -    | -    |
| HCM 95th %ile Q(veh)     | -      | -     | 1.7    | 0.1   | -    | -    |



12239.00 :: Needham Street  
13: Needham Street & Avalon Driveway/Columbia Avenue

2025 Build Conditions with Shuttle Service  
Timing Plan: Saturday Midday

| Lane Group              | EBL   | EBT   | EBR   | WBL   | WBT   | WBR   | NBL   | NBT   | NBR  | SBL   | SBT   | SBR  | Ø1   | Ø3   | Ø5   | Ø7   |
|-------------------------|-------|-------|-------|-------|-------|-------|-------|-------|------|-------|-------|------|------|------|------|------|
| Lane Configurations     |       |       |       |       |       |       |       |       |      |       |       |      |      |      |      |      |
| Traffic Volume (vph)    | 10    | 0     | 10    | 10    | 2     | 10    | 10    | 1085  | 10   | 5     | 885   | 5    |      |      |      |      |
| Future Volume (vph)     | 10    | 0     | 10    | 10    | 2     | 10    | 10    | 1085  | 10   | 5     | 885   | 5    |      |      |      |      |
| Ideal Flow (vphpl)      | 1900  | 1900  | 1900  | 1900  | 1900  | 1900  | 1900  | 1900  | 1900 | 1900  | 1900  | 1900 |      |      |      |      |
| Storage Length (ft)     | 0     |       | 50    | 0     |       | 0     | 125   |       | 0    | 100   |       | 0    |      |      |      |      |
| Storage Lanes           | 0     |       | 1     | 0     |       | 0     | 1     |       | 0    | 1     |       | 0    |      |      |      |      |
| Taper Length (ft)       | 25    |       |       | 25    |       |       | 25    |       |      | 25    |       |      |      |      |      |      |
| Satd. Flow (prot)       | 0     | 1805  | 1615  | 0     | 1713  | 0     | 1805  | 1897  | 0    | 1805  | 1898  | 0    |      |      |      |      |
| Flt Permitted           |       |       |       |       | 0.941 |       | 0.232 |       |      | 0.122 |       |      |      |      |      |      |
| Satd. Flow (perm)       | 0     | 1867  | 1615  | 0     | 1648  | 0     | 441   | 1897  | 0    | 232   | 1898  | 0    |      |      |      |      |
| Right Turn on Red       |       | Yes   |       |       | Yes   |       |       | Yes   |      |       | Yes   |      |      |      |      |      |
| Satd. Flow (RTOR)       |       | 80    |       |       | 11    |       |       | 1     |      |       | 1     |      |      |      |      |      |
| Link Speed (mph)        |       | 30    |       |       | 30    |       |       | 30    |      |       | 30    |      |      |      |      |      |
| Link Distance (ft)      |       | 190   |       |       | 435   |       |       | 338   |      |       | 1135  |      |      |      |      |      |
| Travel Time (s)         |       | 4.3   |       |       | 9.9   |       |       | 7.7   |      |       | 25.8  |      |      |      |      |      |
| Confl. Peds. (#/hr)     | 6     |       |       |       |       | 6     | 11    |       | 12   | 12    |       | 11   |      |      |      |      |
| Confl. Bikes (#/hr)     |       |       |       |       |       |       |       | 2     |      |       |       | 1    |      |      |      |      |
| Peak Hour Factor        | 0.92  | 0.92  | 0.92  | 0.92  | 0.92  | 0.92  | 0.92  | 0.92  | 0.92 | 0.92  | 0.92  | 0.92 |      |      |      |      |
| Heavy Vehicles (%)      | 0%    | 0%    | 0%    | 0%    | 0%    | 0%    | 0%    | 0%    | 0%   | 0%    | 0%    | 0%   |      |      |      |      |
| Shared Lane Traffic (%) |       |       |       |       |       |       |       |       |      |       |       |      |      |      |      |      |
| Lane Group Flow (vph)   | 0     | 11    | 11    | 0     | 24    | 0     | 11    | 1190  | 0    | 5     | 967   | 0    |      |      |      |      |
| Turn Type               | Perm  | NA    | Perm  | Perm  | NA    |       | Perm  | NA    |      | Perm  | NA    |      |      |      |      |      |
| Protected Phases        |       | 4     |       | 8     |       |       | 2     |       |      | 6     |       |      | 1    | 3    | 5    | 7    |
| Permitted Phases        | 4     |       | 4     | 8     |       |       | 2     |       |      | 6     |       |      |      |      |      |      |
| Detector Phase          | 4     | 4     | 4     | 8     | 8     |       | 2     | 2     |      | 6     | 6     |      |      |      |      |      |
| Switch Phase            |       |       |       |       |       |       |       |       |      |       |       |      |      |      |      |      |
| Minimum Initial (s)     | 4.0   | 4.0   | 4.0   | 4.0   | 4.0   |       | 10.0  | 10.0  |      | 10.0  | 10.0  |      | 1.0  | 1.0  | 1.0  | 1.0  |
| Minimum Split (s)       | 19.0  | 19.0  | 19.0  | 22.0  | 22.0  |       | 16.0  | 16.0  |      | 20.0  | 20.0  |      | 3.0  | 3.0  | 3.0  | 3.0  |
| Total Split (s)         | 18.0  | 18.0  | 18.0  | 18.0  | 18.0  |       | 71.0  | 71.0  |      | 71.0  | 71.0  |      | 3.0  | 3.0  | 3.0  | 3.0  |
| Total Split (%)         | 18.9% | 18.9% | 18.9% | 18.9% | 18.9% |       | 74.7% | 74.7% |      | 74.7% | 74.7% |      | 3%   | 3%   | 3%   | 3%   |
| Yellow Time (s)         | 4.0   | 4.0   | 4.0   | 4.0   | 4.0   |       | 4.0   | 4.0   |      | 4.0   | 4.0   |      | 2.0  | 2.0  | 2.0  | 2.0  |
| All-Red Time (s)        | 2.0   | 2.0   | 2.0   | 2.0   | 2.0   |       | 2.0   | 2.0   |      | 2.0   | 2.0   |      | 0.0  | 0.0  | 0.0  | 0.0  |
| Lost Time Adjust (s)    | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   |       | 0.0   | 0.0   |      | 0.0   | 0.0   |      |      |      |      |      |
| Total Lost Time (s)     | 6.0   | 6.0   | 6.0   | 6.0   | 6.0   |       | 6.0   | 6.0   |      | 6.0   | 6.0   |      |      |      |      |      |
| Lead/Lag                | Lag   | Lag   | Lag   | Lag   | Lag   |       | Lag   | Lag   |      | Lag   | Lag   |      | Lead | Lead | Lead | Lead |
| Lead-Lag Optimize?      |       |       |       |       |       |       |       |       |      |       |       |      |      |      |      |      |
| Recall Mode             | None  | None  | None  | None  | None  |       | None  | None  |      | None  | None  |      | None | None | None | None |
| Act Effect Green (s)    | 7.8   | 7.8   | 7.8   | 7.4   | 7.4   |       | 51.7  | 51.7  |      | 51.7  | 51.7  |      |      |      |      |      |
| Actuated g/C Ratio      | 0.13  | 0.13  | 0.13  | 0.13  | 0.13  |       | 0.89  | 0.89  |      | 0.89  | 0.89  |      |      |      |      |      |
| v/c Ratio               | 0.04  | 0.04  | 0.11  | 0.03  | 0.11  |       | 0.03  | 0.71  |      | 0.02  | 0.58  |      |      |      |      |      |
| Control Delay           | 32.1  | 0.3   | 25.9  | 4.2   | 10.0  |       | 4.4   | 6.7   |      | 4.4   | 6.7   |      |      |      |      |      |
| Queue Delay             | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   |       | 0.0   | 0.0   |      | 0.0   | 0.0   |      |      |      |      |      |
| Total Delay             | 32.1  | 0.3   | 25.9  | 4.2   | 10.0  |       | 4.4   | 6.7   |      | 4.4   | 6.7   |      |      |      |      |      |
| LOS                     | C     | A     | C     | C     | A     |       | A     | A     |      | A     | A     |      |      |      |      |      |
| Approach Delay          | 16.2  |       |       | 25.9  |       |       | 9.9   |       |      | 6.7   |       |      |      |      |      |      |
| Approach LOS            | B     |       |       | C     |       |       | A     |       |      | A     |       |      |      |      |      |      |
| Queue Length 50th (ft)  | 3     | 0     | 4     |       | 0     | 0     |       | 0     | 0    |       | 0     |      |      |      |      |      |
| Queue Length 95th (ft)  | 21    | 0     | 30    |       | 9     | #1002 |       | 5     | 565  |       |       |      |      |      |      |      |
| Internal Link Dist (ft) | 110   |       | 355   |       |       |       | 258   |       |      | 1055  |       |      |      |      |      |      |
| Turn Bay Length (ft)    |       | 50    |       |       |       |       | 125   |       |      | 100   |       |      |      |      |      |      |
| Base Capacity (vph)     | 515   | 503   |       | 452   |       |       | 395   | 1700  |      | 208   | 1701  |      |      |      |      |      |
| Starvation Cap Reductn  | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0    | 0     | 0     |      |      |      |      |      |
| Spillback Cap Reductn   | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0    | 0     | 0     |      |      |      |      |      |
| Storage Cap Reductn     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0    | 0     | 0     |      |      |      |      |      |
| Reduced v/c Ratio       | 0.02  | 0.02  |       | 0.05  |       |       | 0.03  | 0.70  |      | 0.02  | 0.57  |      |      |      |      |      |

| Intersection Summary                                            |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|-----------------------------------------------------------------|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|
| Area Type: Other                                                |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Cycle Length: 95                                                |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Actuated Cycle Length: 58.4                                     |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Natural Cycle: 90                                               |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Control Type: Actuated-Uncoordinated                            |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Maximum v/c Ratio: 0.71                                         |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Intersection Signal Delay: 8.7                                  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Intersection Capacity Utilization 76.9%                         |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Analysis Period (min) 15                                        |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| # 95th percentile volume exceeds capacity, queue may be longer. |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Queue shown is maximum after two cycles.                        |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |

Splits and Phases: 13: Needham Street & Avalon Driveway/Columbia Avenue



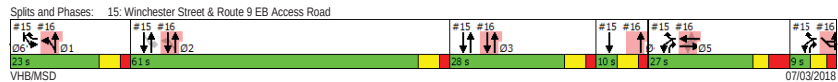
12239.00 :: Needham Street  
14: Winchester Street & Needham Street/Dedham Street

2025 Build Conditions with Shuttle Service  
Timing Plan: Saturday Midday

|                         |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|-------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
| Lane Group              | EBL                                                                                 | EBT                                                                                 | EBR                                                                                 | WBL                                                                                 | WBT                                                                                 | WBR                                                                                 | NBL                                                                                 | NBT                                                                                 | NBR                                                                                 | SBL                                                                                 | SBT                                                                                 | SBR                                                                                 | Ø1                                                                                  | Ø3                                                                                  | Ø5                                                                                  | Ø7                                                                                  |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Lane Configurations     |  |  |                                                                                     |                                                                                     |  |                                                                                     |  |  |                                                                                     |                                                                                     |  |  |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Traffic Volume (vph)    | 865                                                                                 | 155                                                                                 | 85                                                                                  | 20                                                                                  | 155                                                                                 | 90                                                                                  | 50                                                                                  | 220                                                                                 | 10                                                                                  | 50                                                                                  | 215                                                                                 | 690                                                                                 |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Future Volume (vph)     | 865                                                                                 | 155                                                                                 | 85                                                                                  | 20                                                                                  | 155                                                                                 | 90                                                                                  | 50                                                                                  | 220                                                                                 | 10                                                                                  | 50                                                                                  | 215                                                                                 | 690                                                                                 |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Ideal Flow (vphpl)      | 1900                                                                                | 1900                                                                                | 1900                                                                                | 1900                                                                                | 1900                                                                                | 1900                                                                                | 1900                                                                                | 1900                                                                                | 1900                                                                                | 1900                                                                                | 1900                                                                                | 1900                                                                                |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Storage Length (ft)     | 340                                                                                 |                                                                                     | 75                                                                                  | 0                                                                                   |                                                                                     | 0                                                                                   | 100                                                                                 |                                                                                     | 0                                                                                   | 0                                                                                   |                                                                                     | 0                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Storage Lanes           | 1                                                                                   |                                                                                     | 1                                                                                   | 0                                                                                   |                                                                                     | 0                                                                                   | 1                                                                                   |                                                                                     | 0                                                                                   | 0                                                                                   |                                                                                     | 1                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Taper Length (ft)       | 25                                                                                  |                                                                                     |                                                                                     | 25                                                                                  |                                                                                     |                                                                                     | 25                                                                                  |                                                                                     |                                                                                     | 25                                                                                  |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Satd. Flow (prot)       | 3502                                                                                | 1770                                                                                | 0                                                                                   | 0                                                                                   | 1786                                                                                | 0                                                                                   | 1805                                                                                | 1883                                                                                | 0                                                                                   | 0                                                                                   | 1864                                                                                | 1599                                                                                |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Flt Permitted           | 0.950                                                                               |                                                                                     |                                                                                     |                                                                                     | 0.996                                                                               |                                                                                     | 0.444                                                                               |                                                                                     |                                                                                     | 0.784                                                                               |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Satd. Flow (perm)       | 3427                                                                                | 1770                                                                                | 0                                                                                   | 0                                                                                   | 1784                                                                                | 0                                                                                   | 840                                                                                 | 1883                                                                                | 0                                                                                   | 0                                                                                   | 1472                                                                                | 1599                                                                                |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Right Turn on Red       |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Satd. Flow (RTOR)       |                                                                                     | 27                                                                                  | Yes                                                                                 |                                                                                     | 21                                                                                  | Yes                                                                                 |                                                                                     |                                                                                     | No                                                                                  |                                                                                     | Yes                                                                                 |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Link Speed (mph)        |                                                                                     | 30                                                                                  |                                                                                     |                                                                                     | 30                                                                                  |                                                                                     |                                                                                     | 30                                                                                  |                                                                                     |                                                                                     | 30                                                                                  |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Link Distance (ft)      |                                                                                     | 1135                                                                                |                                                                                     |                                                                                     | 451                                                                                 |                                                                                     |                                                                                     | 634                                                                                 |                                                                                     |                                                                                     | 722                                                                                 |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Travel Time (s)         |                                                                                     | 25.8                                                                                |                                                                                     |                                                                                     | 10.3                                                                                |                                                                                     |                                                                                     | 14.4                                                                                |                                                                                     |                                                                                     | 16.4                                                                                |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Confl. Peds. (#/hr)     | 8                                                                                   |                                                                                     | 4                                                                                   | 4                                                                                   |                                                                                     | 8                                                                                   | 4                                                                                   |                                                                                     | 5                                                                                   | 5                                                                                   |                                                                                     | 4                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Confl. Bikes (#/hr)     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     | 1                                                                                   |                                                                                     |                                                                                     | 1                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Peak Hour Factor        | 0.92                                                                                | 0.92                                                                                | 0.92                                                                                | 0.92                                                                                | 0.92                                                                                | 0.92                                                                                | 0.92                                                                                | 0.92                                                                                | 0.92                                                                                | 0.92                                                                                | 0.92                                                                                | 0.92                                                                                |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Heavy Vehicles (%)      | 0%                                                                                  | 0%                                                                                  | 0%                                                                                  | 0%                                                                                  | 0%                                                                                  | 0%                                                                                  | 0%                                                                                  | 0%                                                                                  | 0%                                                                                  | 1%                                                                                  | 1%                                                                                  | 1%                                                                                  |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Shared Lane Traffic (%) |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Lane Group Flow (vph)   | 940                                                                                 | 260                                                                                 | 0                                                                                   | 0                                                                                   | 288                                                                                 | 0                                                                                   | 54                                                                                  | 250                                                                                 | 0                                                                                   | 0                                                                                   | 288                                                                                 | 750                                                                                 |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Turn Type               | Split                                                                               | NA                                                                                  |                                                                                     | Split                                                                               | NA                                                                                  |                                                                                     | Perm                                                                                | NA                                                                                  |                                                                                     | Perm                                                                                | NA                                                                                  | pt+ov                                                                               |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Protected Phases        | 2                                                                                   | 2                                                                                   |                                                                                     | 6                                                                                   | 6                                                                                   |                                                                                     | 4                                                                                   |                                                                                     | 8                                                                                   | 2                                                                                   | 8                                                                                   |                                                                                     | 1                                                                                   | 3                                                                                   | 5                                                                                   | 7                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Permitted Phases        | 2                                                                                   | 2                                                                                   |                                                                                     | 6                                                                                   | 6                                                                                   |                                                                                     | 4                                                                                   | 4                                                                                   |                                                                                     | 8                                                                                   | 8                                                                                   | 2                                                                                   | 8                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Detector Phase          | 2                                                                                   | 2                                                                                   |                                                                                     | 6                                                                                   | 6                                                                                   |                                                                                     | 4                                                                                   | 4                                                                                   |                                                                                     | 8                                                                                   | 8                                                                                   | 2                                                                                   | 8                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Switch Phase            |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Minimum Initial (s)     | 10.0                                                                                | 10.0                                                                                |                                                                                     | 6.0                                                                                 | 6.0                                                                                 |                                                                                     | 6.0                                                                                 | 6.0                                                                                 |                                                                                     | 6.0                                                                                 | 6.0                                                                                 |                                                                                     | 1.0                                                                                 | 1.0                                                                                 | 1.0                                                                                 | 1.0                                                                                 |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Minimum Split (s)       | 17.0                                                                                | 17.0                                                                                |                                                                                     | 19.0                                                                                | 19.0                                                                                |                                                                                     | 20.0                                                                                | 20.0                                                                                |                                                                                     | 36.0                                                                                | 36.0                                                                                |                                                                                     | 3.0                                                                                 | 3.0                                                                                 | 3.0                                                                                 | 3.0                                                                                 |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Total Split (s)         | 37.0                                                                                | 37.0                                                                                |                                                                                     | 21.0                                                                                | 21.0                                                                                |                                                                                     | 37.0                                                                                | 37.0                                                                                |                                                                                     | 37.0                                                                                | 37.0                                                                                |                                                                                     | 3.0                                                                                 | 3.0                                                                                 | 3.0                                                                                 | 3.0                                                                                 |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Total Split (%)         | 35.6%                                                                               | 35.6%                                                                               |                                                                                     | 20.2%                                                                               | 20.2%                                                                               |                                                                                     | 35.6%                                                                               | 35.6%                                                                               |                                                                                     | 35.6%                                                                               | 35.6%                                                                               |                                                                                     | 3%                                                                                  | 3%                                                                                  | 3%                                                                                  | 3%                                                                                  |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Yellow Time (s)         | 4.0                                                                                 | 4.0                                                                                 |                                                                                     | 3.0                                                                                 | 3.0                                                                                 |                                                                                     | 4.0                                                                                 | 4.0                                                                                 |                                                                                     | 4.0                                                                                 | 4.0                                                                                 |                                                                                     | 2.0                                                                                 | 2.0                                                                                 | 2.0                                                                                 | 2.0                                                                                 |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| All-Red Time (s)        | 3.0                                                                                 | 3.0                                                                                 |                                                                                     | 3.0                                                                                 | 3.0                                                                                 |                                                                                     | 3.0                                                                                 | 3.0                                                                                 |                                                                                     | 3.0                                                                                 | 3.0                                                                                 |                                                                                     | 0.0                                                                                 | 0.0                                                                                 | 0.0                                                                                 | 0.0                                                                                 |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Lost Time Adjust (s)    | 0.0                                                                                 | 0.0                                                                                 |                                                                                     | 0.0                                                                                 | 0.0                                                                                 |                                                                                     | 0.0                                                                                 | 0.0                                                                                 |                                                                                     | 0.0                                                                                 | 0.0                                                                                 |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Total Lost Time (s)     | 7.0                                                                                 | 7.0                                                                                 |                                                                                     | 6.0                                                                                 | 7.0                                                                                 |                                                                                     | 7.0                                                                                 | 7.0                                                                                 |                                                                                     | 7.0                                                                                 | 7.0                                                                                 |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Lead/Lag                | Lag                                                                                 | Lag                                                                                 |                                                                                     | Lag                                                                                 | Lag                                                                                 |                                                                                     | Lag                                                                                 | Lag                                                                                 |                                                                                     | Lag                                                                                 | Lag                                                                                 |                                                                                     | Lead                                                                                | Lead                                                                                | Lead                                                                                | Lead                                                                                |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Lead-Lag Optimize?      |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Recall Mode             | None                                                                                | None                                                                                |                                                                                     | None                                                                                | None                                                                                |                                                                                     | None                                                                                | None                                                                                |                                                                                     | None                                                                                | None                                                                                |                                                                                     | None                                                                                | None                                                                                | None                                                                                | None                                                                                |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Act Effect Green (s)    | 29.4                                                                                | 29.4                                                                                |                                                                                     | 15.2                                                                                | 22.2                                                                                |                                                                                     | 22.2                                                                                | 22.2                                                                                |                                                                                     | 22.2                                                                                | 22.2                                                                                |                                                                                     | 57.5                                                                                |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Actuated g/C Ratio      | 0.33                                                                                | 0.33                                                                                |                                                                                     | 0.17                                                                                | 0.25                                                                                |                                                                                     | 0.25                                                                                | 0.25                                                                                |                                                                                     | 0.25                                                                                | 0.65                                                                                |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| v/c Ratio               | 0.81                                                                                | 0.43                                                                                |                                                                                     | 0.89                                                                                | 0.26                                                                                |                                                                                     | 0.26                                                                                | 0.53                                                                                |                                                                                     | 0.78                                                                                | 0.65                                                                                |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Control Delay           | 35.1                                                                                | 25.0                                                                                |                                                                                     | 65.8                                                                                | 30.3                                                                                |                                                                                     | 33.2                                                                                |                                                                                     |                                                                                     | 46.8                                                                                | 7.1                                                                                 |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Queue Delay             | 0.0                                                                                 | 0.0                                                                                 |                                                                                     | 0.0                                                                                 | 0.0                                                                                 |                                                                                     | 0.0                                                                                 | 0.0                                                                                 |                                                                                     | 0.0                                                                                 | 0.0                                                                                 |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Total Delay             | 35.1                                                                                | 25.0                                                                                |                                                                                     | 65.8                                                                                | 30.3                                                                                |                                                                                     | 33.2                                                                                |                                                                                     |                                                                                     | 46.8                                                                                | 7.1                                                                                 |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| LOS                     | D                                                                                   | C                                                                                   |                                                                                     | E                                                                                   | C                                                                                   |                                                                                     | C                                                                                   | C                                                                                   |                                                                                     | D                                                                                   | A                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Approach Delay          |                                                                                     | 32.9                                                                                |                                                                                     |                                                                                     | 65.8                                                                                |                                                                                     |                                                                                     | 32.7                                                                                |                                                                                     |                                                                                     | 18.1                                                                                |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Approach LOS            |                                                                                     | C                                                                                   |                                                                                     |                                                                                     | E                                                                                   |                                                                                     |                                                                                     | C                                                                                   |                                                                                     |                                                                                     | B                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Queue Length 50th (ft)  |                                                                                     | 239                                                                                 | 98                                                                                  |                                                                                     | 147                                                                                 |                                                                                     | 24                                                                                  | 118                                                                                 |                                                                                     |                                                                                     | 147                                                                                 | 87                                                                                  |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Queue Length 95th (ft)  |                                                                                     | #435                                                                                | 306                                                                                 |                                                                                     | #365                                                                                |                                                                                     | 62                                                                                  | 212                                                                                 |                                                                                     |                                                                                     | 266                                                                                 | 221                                                                                 |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Internal Link Dist (ft) |                                                                                     | 1055                                                                                |                                                                                     |                                                                                     | 371                                                                                 |                                                                                     |                                                                                     | 554                                                                                 |                                                                                     |                                                                                     | 642                                                                                 |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Turn Bay Length (ft)    |                                                                                     | 340                                                                                 |                                                                                     |                                                                                     |                                                                                     |                                                                                     | 100                                                                                 |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Base Capacity (vph)     |                                                                                     | 1201                                                                                | 624                                                                                 |                                                                                     | 323                                                                                 |                                                                                     | 288                                                                                 | 646                                                                                 |                                                                                     |                                                                                     | 504                                                                                 | 1162                                                                                |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Starvation Cap Reductn  |                                                                                     | 0                                                                                   | 0                                                                                   |                                                                                     | 0                                                                                   |                                                                                     | 0                                                                                   | 0                                                                                   |                                                                                     |                                                                                     | 0                                                                                   | 0                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Spillback Cap Reductn   |                                                                                     | 0                                                                                   | 0                                                                                   |                                                                                     | 0                                                                                   |                                                                                     | 0                                                                                   | 0                                                                                   |                                                                                     |                                                                                     | 0                                                                                   | 0                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Storage Cap Reductn     |                                                                                     | 0                                                                                   | 0                                                                                   |                                                                                     | 0                                                                                   |                                                                                     | 0                                                                                   | 0                                                                                   |                                                                                     |                                                                                     | 0                                                                                   | 0                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Reduced v/c Ratio       | 0.78                                                                                | 0.42                                                                                |                                                                                     |                                                                                     | 0.89                                                                                |                                                                                     | 0.19                                                                                | 0.39                                                                                |                                                                                     |                                                                                     | 0.57                                                                                | 0.65                                                                                |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |

2025 Build Conditions with Shuttle Service  
Timing Plan: Saturday Midday

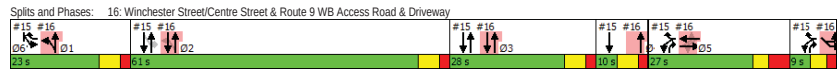
| Intersection Summary               |                                                                 |
|------------------------------------|-----------------------------------------------------------------|
| Area Type:                         | Other                                                           |
| Cycle Length:                      | 158                                                             |
| Actuated Cycle Length:             | 158                                                             |
| Natural Cycle:                     | 145                                                             |
| Control Type:                      | Actuated-Uncoordinated                                          |
| Maximum v/c Ratio:                 | 1.10                                                            |
| Intersection Signal Delay:         | 43.4                                                            |
| Intersection Capacity Utilization: | 73.1%                                                           |
| Analysis Period (min):             | 15                                                              |
| #                                  | 95th percentile volume exceeds capacity, queue may be longer.   |
|                                    | Queue shown is maximum after two cycles.                        |
| m                                  | Volume for 95th percentile queue is metered by upstream signal. |



| Lane Group              | EBL   | EBT   | EBR  | WBL   | WBT   | WBR2 | NBL2   | NBT     | SBT  | SBR  | SER  | Ø2   | Ø3   | Ø4   |
|-------------------------|-------|-------|------|-------|-------|------|--------|---------|------|------|------|------|------|------|
| Lane Configurations     |       |       |      |       |       |      |        |         |      |      |      |      |      |      |
| Traffic Volume (vph)    | 1     | 0     | 40   | 200   | 20    | 15   | 200    | 830     | 760  | 130  | 0    | 1    |      |      |
| Future Volume (vph)     | 1     | 0     | 40   | 200   | 20    | 15   | 200    | 830     | 760  | 130  | 0    | 1    |      |      |
| Ideal Flow (vph/pl)     | 1900  | 1900  | 1900 | 1900  | 1900  | 1900 | 1900   | 1900    | 1900 | 1900 | 1900 | 1900 |      |      |
| Storage Length (ft)     | 0     | 0     | 0    | 100   |       |      |        |         |      | 0    | 0    | 0    |      |      |
| Storage Lanes           | 0     | 0     | 0    | 1     |       |      |        |         |      | 0    | 1    | 0    |      |      |
| Taper Length (ft)       | 25    |       |      | 25    |       |      |        |         |      |      | 25   |      |      |      |
| Satd. Flow (prot)       | 0     | 1621  | 0    | 1805  | 1780  | 0    | 1805   | 1900    | 1841 | 0    | 1611 | 0    |      |      |
| Flt Permitted           | 0.995 |       |      | 0.825 |       |      | 0.073  |         |      |      |      |      |      |      |
| Satd. Flow (perm)       | 0     | 1614  | 0    | 1561  | 1780  | 0    | 139    | 1900    | 1841 | 0    | 1611 | 0    |      |      |
| Right Turn on Red       |       |       | Yes  |       |       | Yes  |        |         |      |      |      |      |      |      |
| Satd. Flow (RTOR)       | 180   |       |      | 180   |       |      |        |         |      |      |      |      |      |      |
| Link Speed (mph)        | 30    |       |      | 30    |       |      |        | 30      | 30   |      | 30   |      |      |      |
| Link Distance (ft)      | 401   |       |      | 460   |       |      |        | 252     | 508  |      | 280  |      |      |      |
| Travel Time (s)         | 9.1   |       |      | 10.5  |       |      |        | 5.7     | 11.5 |      | 6.4  |      |      |      |
| Confl. Peds. (#/hr)     |       |       | 2    | 2     |       |      | 13     |         |      | 13   |      |      |      |      |
| Confl. Bikes (#/hr)     |       |       |      |       |       |      |        |         |      | 4    |      |      |      |      |
| Peak Hour Factor        | 0.92  | 0.92  | 0.92 | 0.92  | 0.92  | 0.92 | 0.92   | 0.92    | 0.92 | 0.92 | 0.92 | 0.92 |      |      |
| Heavy Vehicles (%)      | 0%    | 0%    | 0%   | 0%    | 0%    | 0%   | 0%     | 0%      | 0%   | 0%   | 2%   | 2%   |      |      |
| Shared Lane Traffic (%) |       |       |      |       |       |      |        |         |      |      |      |      |      |      |
| Lane Group Flow (vph)   | 0     | 44    | 0    | 217   | 38    | 0    | 217    | 902     | 967  | 0    | 1    | 0    |      |      |
| Turn Type               | Perm  | NA    |      | Perm  | NA    |      | custom | NA      | NA   |      | Prot |      |      |      |
| Protected Phases        | 5     | 5     |      | 5     | 5     |      | 1      | 1 2 3 4 | 2 3  |      | 6    |      | 2    | 3    |
| Permitted Phases        | 5     | 5     |      | 5     | 5     |      | 2      |         |      |      |      |      |      | 4    |
| Detector Phase          | 5     | 5     |      | 5     | 5     |      | 1      | 1 2 3 4 | 2 3  |      | 6    |      |      |      |
| Switch Phase            |       |       |      |       |       |      |        |         |      |      |      |      |      |      |
| Minimum Initial (s)     | 4.0   | 4.0   |      | 4.0   | 4.0   |      | 4.0    |         |      | 4.0  |      | 10.0 | 10.0 | 4.0  |
| Minimum Split (s)       | 11.0  | 11.0  |      | 11.0  | 11.0  |      | 10.0   |         |      | 9.0  |      | 25.0 | 27.0 | 10.0 |
| Total Split (s)         | 27.0  | 27.0  |      | 27.0  | 27.0  |      | 23.0   |         |      | 9.0  |      | 61.0 | 28.0 | 10.0 |
| Total Split (%)         | 17.1% | 17.1% |      | 17.1% | 17.1% |      | 14.6%  |         |      | 5.7% |      | 39%  | 18%  | 6%   |
| Yellow Time (s)         | 3.0   | 3.0   |      | 3.0   | 3.0   |      | 4.0    |         |      | 3.0  |      | 4.0  | 4.0  | 4.0  |
| All-Red Time (s)        | 4.0   | 4.0   |      | 4.0   | 4.0   |      | 2.0    |         |      | 2.0  |      | 2.0  | 2.0  | 2.0  |
| Lost Time Adjust (s)    | 0.0   | 0.0   |      | 0.0   | 0.0   |      | 0.0    |         |      | 0.0  |      | 0.0  |      |      |
| Total Lost Time (s)     | 7.0   | 7.0   |      | 7.0   | 7.0   |      | 6.0    |         |      | 5.0  |      |      |      |      |
| Lead/Lag                | Lead  | Lead  |      | Lead  | Lead  |      | Lead   |         |      | Lag  |      | Lag  | Lead | Lag  |
| Lead-Lag Optimize?      |       |       |      |       |       |      |        |         |      |      |      |      |      |      |
| Recall Mode             | None  | None  |      | None  | None  |      | None   |         |      | None |      | None | None | None |
| Act Effct Green (s)     | 20.0  | 20.0  |      | 20.0  | 20.0  |      | 72.0   | 116.0   | 83.0 |      | 4.0  |      |      |      |
| Actuated g/C Ratio      | 0.13  | 0.13  |      | 0.13  | 0.13  |      | 0.46   | 0.73    | 0.53 |      | 0.03 |      |      |      |
| v/c Ratio               | 0.12  | 1.10  |      | 0.10  | 0.10  |      | 0.90   | 0.65    | 1.00 |      | 0.03 |      |      |      |
| Control Delay           | 0.7   | 154.6 |      | 0.5   | 89.3  |      | 3.5    | 66.0    |      | 76.0 |      |      |      |      |
| Queue Delay             | 0.1   | 3.1   |      | 0.0   | 0.0   |      | 2.3    | 36.3    |      | 0.0  |      |      |      |      |
| Total Delay             | 0.8   | 157.7 |      | 0.5   | 89.3  |      | 5.8    | 102.4   |      | 76.0 |      |      |      |      |
| LOS                     | A     | F     |      |       |       |      |        |         |      |      |      |      |      |      |

Lanes, Volumes, Timings  
VHB/MSD

12239.00 :: Needham Street  
16: Winchester Street/Centre Street & Route 9 WB Access Road & Driveway  
2025 Build Conditions with Shuttle Service  
Timing Plan: Saturday MIDDAY



12239.00 :: Needham Street  
17: Centre Street & Walnut Street  
2025 Build Conditions with Shuttle Service  
Timing Plan: Saturday MIDDAY

| Lane Group              | SEL   | SET   | SER   | NWL   | NWT   | NWR   | NEL   | NET  | NER   | SWL   | SWT   | SWR  | Ø3 |
|-------------------------|-------|-------|-------|-------|-------|-------|-------|------|-------|-------|-------|------|----|
| Lane Configurations     |       |       |       |       |       |       |       |      |       |       |       |      |    |
| Traffic Volume (vph)    | 30    | 10    | 380   | 40    | 95    | 5     | 455   | 380  | 10    | 5     | 470   | 65   |    |
| Future Volume (vph)     | 30    | 10    | 380   | 40    | 95    | 5     | 455   | 380  | 10    | 5     | 470   | 65   |    |
| Ideal Flow (vphpl)      | 1900  | 1900  | 1900  | 1900  | 1900  | 1900  | 1900  | 1900 | 1900  | 1900  | 1900  | 1900 |    |
| Storage Length (ft)     | 0     | 0     | 50    | 0     | 0     | 0     | 75    | 0    | 0     | 0     | 0     | 0    |    |
| Storage Lanes           | 0     | 0     | 1     | 0     | 0     | 0     | 1     | 0    | 0     | 0     | 0     | 0    |    |
| Taper Length (ft)       | 25    | 0     | 0     | 25    | 0     | 0     | 25    | 0    | 0     | 25    | 0     | 0    |    |
| Satd. Flow (prot)       | 0     | 1813  | 1599  | 0     | 1864  | 0     | 1805  | 1891 | 0     | 0     | 1863  | 0    |    |
| Flt Permitted           | 0.573 |       |       | 0.888 |       | 0.299 |       |      | 0.997 |       |       |      |    |
| Satd. Flow (perm)       | 0     | 1071  | 1557  | 0     | 1672  | 0     | 567   | 1891 | 0     | 0     | 1858  | 0    |    |
| Right Turn on Red       |       | No    |       |       | No    |       |       | Yes  |       |       | Yes   |      |    |
| Satd. Flow (RTOR)       |       |       |       |       |       |       |       | 2    |       |       | 7     |      |    |
| Link Speed (mph)        | 30    |       |       | 30    |       |       | 30    |      |       | 30    |       |      |    |
| Link Distance (ft)      | 624   |       |       | 387   |       |       | 508   |      |       | 531   |       |      |    |
| Travel Time (s)         | 14.2  |       |       | 8.8   |       |       | 11.5  |      |       | 12.1  |       |      |    |
| Confl. Peds. (#/hr)     | 4     |       | 4     | 4     |       | 4     | 4     |      | 3     | 3     |       | 4    |    |
| Confl. Bikes (#/hr)     |       |       |       |       |       |       |       |      |       |       |       |      | 2  |
| Peak Hour Factor        | 0.92  | 0.92  | 0.92  | 0.92  | 0.92  | 0.92  | 0.92  | 0.92 | 0.92  | 0.92  | 0.92  | 0.92 |    |
| Heavy Vehicles (%)      | 1%    | 1%    | 1%    | 0%    | 0%    | 0%    | 0%    | 0%   | 0%    | 0%    | 0%    | 0%   |    |
| Shared Lane Traffic (%) |       |       |       |       |       |       |       |      |       |       |       |      |    |
| Lane Group Flow (vph)   | 0     | 44    | 413   | 0     | 151   | 0     | 495   | 424  | 0     | 0     | 587   | 0    |    |
| Turn Type               | Perm  | NA    | pm+ov | Perm  | NA    |       | D,P+P | NA   |       | Perm  | NA    |      |    |
| Protected Phases        | 4     | 1     |       | 4     | 1     |       | 1     | 12   |       | 2     |       | 3    |    |
| Permitted Phases        | 4     |       | 4     | 4     |       |       | 2     |      |       | 2     |       |      |    |
| Detector Phase          | 4     | 4     | 1     | 4     | 4     |       | 1     | 12   |       | 2     | 2     |      |    |
| Switch Phase            |       |       |       |       |       |       |       |      |       |       |       |      |    |
| Minimum Initial (s)     | 9.0   | 9.0   | 7.0   | 9.0   | 9.0   |       | 7.0   |      |       | 6.0   | 6.0   | 4.0  |    |
| Minimum Split (s)       | 14.0  | 14.0  | 12.0  | 14.0  | 14.0  |       | 12.0  |      |       | 11.0  | 11.0  | 19.0 |    |
| Total Split (s)         | 19.0  | 19.0  | 25.0  | 19.0  | 19.0  |       | 25.0  |      |       | 45.0  | 45.0  | 19.0 |    |
| Total Split (%)         | 17.6% | 17.6% | 23.1% | 17.6% | 17.6% |       | 23.1% |      |       | 41.7% | 41.7% | 18%  |    |
| Yellow Time (s)         | 4.0   | 4.0   | 4.0   | 4.0   | 4.0   |       | 4.0   |      |       | 4.0   | 4.0   | 4.0  |    |
| All-Red Time (s)        | 1.0   | 1.0   | 1.0   | 1.0   | 1.0   |       | 1.0   |      |       | 1.0   | 1.0   | 0.0  |    |
| Lost Time Adjust (s)    | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   |       | 0.0   |      |       | 0.0   | 0.0   |      |    |
| Total Lost Time (s)     | 5.0   | 5.0   | 5.0   | 5.0   | 5.0   |       | 5.0   |      |       | 5.0   | 5.0   |      |    |
| Lead/Lag                | Lag   | Lag   | Lead  | Lag   | Lag   |       | Lead  |      |       | Lag   | Lag   | Lead |    |
| Lead-Lag Optimize?      |       |       |       |       |       |       |       |      |       |       |       |      |    |
| Recall Mode             | Min   | Min   | Max   | Min   | Min   |       | Max   |      |       | Max   | Max   | None |    |
| Act Effct Green (s)     | 12.0  | 32.2  |       | 12.0  |       |       | 60.8  |      | 65.8  |       | 40.5  |      |    |
| Actuated g/C Ratio      | 0.13  | 0.34  |       | 0.13  |       | 0.64  | 0.70  |      |       | 0.43  |       |      |    |
| v/c Ratio               | 0.33  | 0.77  |       | 0.71  |       | 0.79  | 0.32  |      |       | 0.73  |       |      |    |
| Control Delay           | 47.4  | 38.1  |       | 60.8  |       | 22.0  | 8.2   |      |       | 31.4  |       |      |    |
| Queue Delay             | 0.0   | 0.0   |       | 0.0   |       | 0.3   | 0.5   |      |       | 0.0   |       |      |    |
| Total Delay             | 47.4  | 38.1  |       | 60.8  |       | 22.3  | 8.8   |      |       | 31.4  |       |      |    |
| LOS                     | D     | D     |       | E     |       | C     | A     |      |       | C     |       |      |    |
| Approach Delay          | 39.0  |       |       | 60.8  |       |       | 16.0  |      |       | 31.4  |       |      |    |
| Approach LOS            | D     |       |       | E     |       |       | B     |      |       | C     |       |      |    |
| Queue Length 50th (ft)  | 22    | 170   |       | 80    |       | 79    | 63    |      |       | 245   |       |      |    |
| Queue Length 95th (ft)  | 64    | #412  |       | #192  |       | #369  | 203   |      |       | #560  |       |      |    |
| Internal Link Dist (ft) | 544   |       |       | 307   |       |       | 428   |      |       | 451   |       |      |    |
| Turn Bay Length (ft)    |       | 50    |       |       |       | 75    |       |      |       |       |       |      |    |
| Base Capacity (vph)     | 160   | 539   |       | 250   |       | 629   | 1316  |      |       | 799   |       |      |    |
| Starvation Cap Reductn  | 0     | 0     |       | 0     |       | 10    | 496   |      |       | 0     |       |      |    |
| Spillback Cap Reductn   | 0     | 0     |       | 0     |       | 0     | 0     |      |       | 0     |       |      |    |
| Storage Cap Reductn     | 0     | 0     |       | 0     |       | 0     | 0     |      |       | 0     |       |      |    |
| Reduced v/c Ratio       | 0.28  | 0.77  |       | 0.60  |       | 0.80  | 0.52  |      |       | 0.73  |       |      |    |

| Intersection Summary               |                                                               |
|------------------------------------|---------------------------------------------------------------|
| Area Type:                         | Other                                                         |
| Cycle Length:                      | 108                                                           |
| Actuated Cycle Length:             | 94.6                                                          |
| Natural Cycle:                     | 90                                                            |
| Control Type:                      | Semi Act-Uncoord                                              |
| Maximum v/c Ratio:                 | 0.79                                                          |
| Intersection Signal Delay:         | 28.5                                                          |
| Intersection Capacity Utilization: | 80.9%                                                         |
| Analysis Period (min):             | 15                                                            |
| #                                  | 95th percentile volume exceeds capacity, queue may be longer. |
|                                    | Queue shown is maximum after two cycles.                      |



12239.00 :: Needham Street  
18: Nahanton Street & Winchester Street

2025 Build Conditions with Shuttle Service  
Timing Plan: Saturday Midday

| Lane Group              | EBL                                                                               | EBT                                                                               | WBT                                                                               | WBR                                                                               | SBL                                                                               | SBR                                                                               |
|-------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|
| Lane Configurations     |  |  |  |  |  |  |
| Traffic Volume (vph)    | 275                                                                               | 470                                                                               | 505                                                                               | 80                                                                                | 100                                                                               | 300                                                                               |
| Future Volume (vph)     | 275                                                                               | 470                                                                               | 505                                                                               | 80                                                                                | 100                                                                               | 300                                                                               |
| Ideal Flow (vphpl)      | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                              |
| Storage Length (ft)     | 175                                                                               |                                                                                   |                                                                                   |                                                                                   | 75                                                                                | 0                                                                                 |
| Storage Lanes           | 1                                                                                 |                                                                                   |                                                                                   |                                                                                   | 1                                                                                 |                                                                                   |
| Taper Length (ft)       | 25                                                                                |                                                                                   |                                                                                   |                                                                                   | 25                                                                                |                                                                                   |
| Satd. Flow (prot)       | 1805                                                                              | 1900                                                                              | 1858                                                                              | 0                                                                                 | 1805                                                                              | 1615                                                                              |
| Flt Permitted           | 0.231                                                                             |                                                                                   |                                                                                   |                                                                                   | 0.950                                                                             |                                                                                   |
| Satd. Flow (perm)       | 439                                                                               | 1900                                                                              | 1858                                                                              | 0                                                                                 | 1805                                                                              | 1615                                                                              |
| Right Turn on Red       |                                                                                   |                                                                                   |                                                                                   | Yes                                                                               |                                                                                   | No                                                                                |
| Satd. Flow (RTOR)       |                                                                                   |                                                                                   | 13                                                                                |                                                                                   |                                                                                   |                                                                                   |
| Link Speed (mph)        |                                                                                   | 30                                                                                | 30                                                                                |                                                                                   | 30                                                                                |                                                                                   |
| Link Distance (ft)      |                                                                                   | 963                                                                               | 734                                                                               |                                                                                   | 889                                                                               |                                                                                   |
| Travel Time (s)         |                                                                                   | 21.9                                                                              | 16.7                                                                              |                                                                                   | 20.2                                                                              |                                                                                   |
| Confl. Peds. (#/hr)     | 1                                                                                 |                                                                                   |                                                                                   | 1                                                                                 |                                                                                   |                                                                                   |
| Confl. Bikes (#/hr)     |                                                                                   |                                                                                   |                                                                                   | 13                                                                                |                                                                                   |                                                                                   |
| Peak Hour Factor        | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              |
| Heavy Vehicles (%)      | 0%                                                                                | 0%                                                                                | 0%                                                                                | 0%                                                                                | 0%                                                                                | 0%                                                                                |
| Shared Lane Traffic (%) |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| Lane Group Flow (vph)   | 299                                                                               | 511                                                                               | 636                                                                               | 0                                                                                 | 109                                                                               | 326                                                                               |
| Turn Type               | pm+pt                                                                             | NA                                                                                | NA                                                                                |                                                                                   | Prot                                                                              | pt+ov                                                                             |
| Protected Phases        | 5                                                                                 | 2                                                                                 | 6                                                                                 |                                                                                   | 8                                                                                 | 5 8                                                                               |
| Permitted Phases        | 2                                                                                 |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| Detector Phase          | 5                                                                                 | 2                                                                                 | 6                                                                                 |                                                                                   | 8                                                                                 | 5 8                                                                               |
| Switch Phase            |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| Minimum Initial (s)     | 6.0                                                                               | 10.0                                                                              | 10.0                                                                              |                                                                                   | 6.0                                                                               |                                                                                   |
| Minimum Split (s)       | 11.0                                                                              | 15.0                                                                              | 23.0                                                                              |                                                                                   | 10.0                                                                              |                                                                                   |
| Total Split (s)         | 17.0                                                                              | 67.0                                                                              | 50.0                                                                              |                                                                                   | 21.0                                                                              |                                                                                   |
| Total Split (%)         | 19.3%                                                                             | 76.1%                                                                             | 56.8%                                                                             |                                                                                   | 23.9%                                                                             |                                                                                   |
| Yellow Time (s)         | 3.0                                                                               | 3.0                                                                               | 3.0                                                                               |                                                                                   | 3.0                                                                               |                                                                                   |
| All-Red Time (s)        | 2.0                                                                               | 2.0                                                                               | 2.0                                                                               |                                                                                   | 1.0                                                                               |                                                                                   |
| Lost Time Adjust (s)    | 0.0                                                                               | 0.0                                                                               | 0.0                                                                               |                                                                                   | 0.0                                                                               |                                                                                   |
| Total Lost Time (s)     | 5.0                                                                               | 5.0                                                                               | 5.0                                                                               |                                                                                   | 4.0                                                                               |                                                                                   |
| Lead/Lag                | Lead                                                                              |                                                                                   | Lag                                                                               |                                                                                   |                                                                                   |                                                                                   |
| Lead-Lag Optimize?      | Yes                                                                               |                                                                                   | Yes                                                                               |                                                                                   |                                                                                   |                                                                                   |
| Recall Mode             | None                                                                              | C-Min                                                                             | None                                                                              |                                                                                   | None                                                                              |                                                                                   |
| Act Effct Green (s)     | 61.6                                                                              | 61.6                                                                              | 45.8                                                                              |                                                                                   | 17.4                                                                              | 32.2                                                                              |
| Actuated g/C Ratio      | 0.70                                                                              | 0.70                                                                              | 0.52                                                                              |                                                                                   | 0.20                                                                              | 0.37                                                                              |
| v/c Ratio               | 0.63                                                                              | 0.38                                                                              | 0.65                                                                              |                                                                                   | 0.31                                                                              | 0.55                                                                              |
| Control Delay           | 11.5                                                                              | 6.7                                                                               | 20.0                                                                              |                                                                                   | 32.0                                                                              | 25.6                                                                              |
| Queue Delay             | 0.0                                                                               | 0.0                                                                               | 0.0                                                                               |                                                                                   | 0.0                                                                               | 0.0                                                                               |
| Total Delay             | 11.5                                                                              | 6.7                                                                               | 20.0                                                                              |                                                                                   | 32.0                                                                              | 25.6                                                                              |
| LOS                     | B                                                                                 | A                                                                                 | C                                                                                 |                                                                                   | C                                                                                 | C                                                                                 |
| Approach Delay          |                                                                                   | 8.5                                                                               | 20.0                                                                              |                                                                                   | 27.2                                                                              |                                                                                   |
| Approach LOS            |                                                                                   | A                                                                                 | C                                                                                 |                                                                                   | C                                                                                 |                                                                                   |
| Queue Length 50th (ft)  | 54                                                                                | 105                                                                               | 247                                                                               |                                                                                   | 51                                                                                | 137                                                                               |
| Queue Length 95th (ft)  | 79                                                                                | 145                                                                               | 363                                                                               |                                                                                   | 100                                                                               | 222                                                                               |
| Internal Link Dist (ft) |                                                                                   | 883                                                                               | 654                                                                               |                                                                                   | 809                                                                               |                                                                                   |
| Turn Bay Length (ft)    | 175                                                                               |                                                                                   |                                                                                   |                                                                                   | 75                                                                                |                                                                                   |
| Base Capacity (vph)     | 500                                                                               | 1360                                                                              | 1008                                                                              |                                                                                   | 377                                                                               | 602                                                                               |
| Starvation Cap Reductn  | 0                                                                                 | 0                                                                                 | 0                                                                                 |                                                                                   | 0                                                                                 | 0                                                                                 |
| Spillback Cap Reductn   | 0                                                                                 | 0                                                                                 | 0                                                                                 |                                                                                   | 0                                                                                 | 0                                                                                 |
| Storage Cap Reductn     | 0                                                                                 | 0                                                                                 | 0                                                                                 |                                                                                   | 0                                                                                 | 0                                                                                 |
| Reduced v/c Ratio       | 0.60                                                                              | 0.38                                                                              | 0.63                                                                              |                                                                                   | 0.29                                                                              | 0.54                                                                              |

| Intersection Summary                                       |                        |
|------------------------------------------------------------|------------------------|
| Area Type:                                                 | Other                  |
| Cycle Length: 88                                           |                        |
| Actuated Cycle Length: 88                                  |                        |
| Offset: 8 (9%), Referenced to phase 2:EBTL, Start of Green |                        |
| Natural Cycle: 55                                          |                        |
| Control Type: Actuated-Coordinated                         |                        |
| Maximum v/c Ratio: 0.65                                    |                        |
| Intersection Signal Delay: 16.7                            | Intersection LOS: B    |
| Intersection Capacity Utilization 63.9%                    | ICU Level of Service B |
| Analysis Period (min) 15                                   |                        |

Splits and Phases: 18: Nahanton Street & Winchester Street



12239.00 :: Needham Street  
19: Wells Avenue/JCC Driveway & Nahanton Street

2025 Build Conditions with Shuttle Service  
Timing Plan: Saturday Midday

| Lane Group              | EBL                                                                                 | EBT                                                                                 | EBR                                                                                 | WBL                                                                                 | WBT                                                                                 | WBR                                                                                 | NBL                                                                                 | NBT                                                                                 | NBR                                                                                 | SBL                                                                                 | SBT                                                                                 | SBR                                                                                 |
|-------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
| Lane Configurations     |  |  |  |  |  |  |  |  |  |  |  |  |
| Traffic Volume (vph)    | 20                                                                                  | 565                                                                                 | 140                                                                                 | 190                                                                                 | 585                                                                                 | 30                                                                                  | 215                                                                                 | 5                                                                                   | 140                                                                                 | 40                                                                                  | 2                                                                                   | 35                                                                                  |
| Future Volume (vph)     | 20                                                                                  | 565                                                                                 | 140                                                                                 | 190                                                                                 | 585                                                                                 | 30                                                                                  | 215                                                                                 | 5                                                                                   | 140                                                                                 | 40                                                                                  | 2                                                                                   | 35                                                                                  |
| Ideal Flow (vphpl)      | 1900                                                                                | 1900                                                                                | 1900                                                                                | 1900                                                                                | 1900                                                                                | 1900                                                                                | 1900                                                                                | 1900                                                                                | 1900                                                                                | 1900                                                                                | 1900                                                                                | 1900                                                                                |
| Storage Length (ft)     | 125                                                                                 |                                                                                     | 125                                                                                 | 150                                                                                 |                                                                                     |                                                                                     | 0                                                                                   | 0                                                                                   |                                                                                     | 0                                                                                   | 75                                                                                  | 0                                                                                   |
| Storage Lanes           | 1                                                                                   |                                                                                     | 1                                                                                   |                                                                                     |                                                                                     |                                                                                     | 0                                                                                   | 1                                                                                   |                                                                                     | 0                                                                                   | 1                                                                                   | 0                                                                                   |
| Taper Length (ft)       | 25                                                                                  |                                                                                     | 25                                                                                  |                                                                                     |                                                                                     |                                                                                     | 25                                                                                  |                                                                                     |                                                                                     | 25                                                                                  |                                                                                     |                                                                                     |
| Satd. Flow (prot)       | 1805                                                                                | 1900                                                                                | 1615                                                                                | 1805                                                                                | 1884                                                                                | 0                                                                                   | 1805                                                                                | 1624                                                                                | 0                                                                                   | 1805                                                                                | 1628                                                                                | 0                                                                                   |
| Flt Permitted           | 0.218                                                                               |                                                                                     |                                                                                     | 0.262                                                                               |                                                                                     |                                                                                     | 0.731                                                                               |                                                                                     | 0.635                                                                               |                                                                                     |                                                                                     |                                                                                     |
| Satd. Flow (perm)       | 414                                                                                 | 1900                                                                                | 1570                                                                                | 498                                                                                 | 1884                                                                                | 0                                                                                   | 1389                                                                                | 1624                                                                                | 0                                                                                   | 1206                                                                                | 1628                                                                                | 0                                                                                   |
| Right Turn on Red       |                                                                                     |                                                                                     | Yes                                                                                 |                                                                                     | Yes                                                                                 |                                                                                     |                                                                                     | Yes                                                                                 |                                                                                     | Yes                                                                                 |                                                                                     | Yes                                                                                 |
| Satd. Flow (RTOR)       |                                                                                     |                                                                                     | 130                                                                                 |                                                                                     | 5                                                                                   |                                                                                     |                                                                                     | 152                                                                                 |                                                                                     | 38                                                                                  |                                                                                     |                                                                                     |
| Link Speed (mph)        |                                                                                     | 30                                                                                  |                                                                                     |                                                                                     | 30                                                                                  |                                                                                     |                                                                                     | 30                                                                                  |                                                                                     | 30                                                                                  |                                                                                     |                                                                                     |
| Link Distance (ft)      |                                                                                     | 797                                                                                 |                                                                                     |                                                                                     | 963                                                                                 |                                                                                     |                                                                                     | 598                                                                                 |                                                                                     | 628                                                                                 |                                                                                     |                                                                                     |
| Travel Time (s)         |                                                                                     | 18.1                                                                                |                                                                                     |                                                                                     | 21.9                                                                                |                                                                                     |                                                                                     | 13.6                                                                                |                                                                                     | 14.3                                                                                |                                                                                     |                                                                                     |
| Confl. Peds. (#/hr)     |                                                                                     |                                                                                     | 1                                                                                   | 1                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Confl. Bikes (#/hr)     |                                                                                     |                                                                                     | 10                                                                                  |                                                                                     |                                                                                     |                                                                                     | 12                                                                                  |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Peak Hour Factor        | 0.92                                                                                | 0.92                                                                                | 0.92                                                                                | 0.92                                                                                | 0.92                                                                                | 0.92                                                                                | 0.92                                                                                | 0.92                                                                                | 0.92                                                                                | 0.92                                                                                | 0.92                                                                                | 0.92                                                                                |
| Heavy Vehicles (%)      | 0%                                                                                  | 0%                                                                                  | 0%                                                                                  | 0%                                                                                  | 0%                                                                                  | 0%                                                                                  | 0%                                                                                  | 0%                                                                                  | 0%                                                                                  | 0%                                                                                  | 0%                                                                                  | 0%                                                                                  |
| Shared Lane Traffic (%) |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Lane Group Flow (vph)   | 22                                                                                  | 614                                                                                 | 152                                                                                 | 207                                                                                 | 669                                                                                 | 0                                                                                   | 234                                                                                 | 157                                                                                 | 0                                                                                   | 43                                                                                  | 40                                                                                  | 0                                                                                   |
| Turn Type               | pm+pt                                                                               | NA                                                                                  | Perm                                                                                | pm+pt                                                                               | NA                                                                                  |                                                                                     | Perm                                                                                | NA                                                                                  |                                                                                     | Perm                                                                                | NA                                                                                  |                                                                                     |
| Protected Phases        | 3                                                                                   | 1                                                                                   |                                                                                     | 3                                                                                   | 1                                                                                   |                                                                                     |                                                                                     | 2                                                                                   |                                                                                     |                                                                                     | 2                                                                                   |                                                                                     |
| Permitted Phases        | 1                                                                                   |                                                                                     | 1                                                                                   | 1                                                                                   |                                                                                     |                                                                                     | 2                                                                                   |                                                                                     |                                                                                     | 2                                                                                   |                                                                                     |                                                                                     |
| Detector Phase          | 3                                                                                   | 1                                                                                   | 1                                                                                   | 3                                                                                   | 1                                                                                   |                                                                                     | 2                                                                                   | 2                                                                                   |                                                                                     | 2                                                                                   | 2                                                                                   |                                                                                     |
| Switch Phase            |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Minimum Initial (s)     | 6.0                                                                                 | 6.0                                                                                 | 6.0                                                                                 | 6.0                                                                                 | 6.0                                                                                 |                                                                                     | 6.0                                                                                 | 6.0                                                                                 |                                                                                     | 6.0                                                                                 | 6.0                                                                                 |                                                                                     |
| Minimum Split (s)       | 10.0                                                                                | 11.0                                                                                | 11.0                                                                                | 10.0                                                                                | 11.0                                                                                |                                                                                     | 11.0                                                                                | 11.0                                                                                |                                                                                     | 11.0                                                                                | 11.0                                                                                |                                                                                     |
| Total Split (s)         | 16.0                                                                                | 55.0                                                                                | 55.0                                                                                | 16.0                                                                                | 55.0                                                                                |                                                                                     | 20.0                                                                                | 20.0                                                                                |                                                                                     | 20.0                                                                                | 20.0                                                                                |                                                                                     |
| Total Split (%)         | 17.6%                                                                               | 60.4%                                                                               | 60.4%                                                                               | 17.6%                                                                               | 60.4%                                                                               |                                                                                     | 22.0%                                                                               | 22.0%                                                                               |                                                                                     | 22.0%                                                                               | 22.0%                                                                               |                                                                                     |
| Yellow Time (s)         | 3.0                                                                                 | 3.0                                                                                 | 3.0                                                                                 | 3.0                                                                                 | 3.0                                                                                 |                                                                                     | 3.0                                                                                 | 3.0                                                                                 |                                                                                     | 3.0                                                                                 | 3.0                                                                                 |                                                                                     |
| All-Red Time (s)        | 1.0                                                                                 | 2.0                                                                                 | 2.0                                                                                 | 1.0                                                                                 | 2.0                                                                                 |                                                                                     | 2.0                                                                                 | 2.0                                                                                 |                                                                                     | 2.0                                                                                 | 2.0                                                                                 |                                                                                     |
| Lost Time Adjust (s)    | 0.0                                                                                 | 0.0                                                                                 | 0.0                                                                                 | 0.0                                                                                 | 0.0                                                                                 |                                                                                     | 0.0                                                                                 | 0.0                                                                                 |                                                                                     | 0.0                                                                                 | 0.0                                                                                 |                                                                                     |
| Total Lost Time (s)     | 4.0                                                                                 | 5.0                                                                                 | 5.0                                                                                 | 4.0                                                                                 | 5.0                                                                                 |                                                                                     | 5.0                                                                                 | 5.0                                                                                 |                                                                                     | 5.0                                                                                 | 5.0                                                                                 |                                                                                     |
| Lead/Lag                |                                                                                     | Lead                                                                                | Lead                                                                                |                                                                                     | Lead                                                                                |                                                                                     | Lag                                                                                 | Lag                                                                                 |                                                                                     | Lag                                                                                 | Lag                                                                                 |                                                                                     |
| Lead-Lag Optimize?      |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Recall Mode             | None                                                                                | None                                                                                | None                                                                                | None                                                                                | None                                                                                |                                                                                     | None                                                                                | None                                                                                |                                                                                     | None                                                                                | None                                                                                |                                                                                     |
| Act Effct Green (s)     | 44.8                                                                                | 36.1                                                                                | 36.1                                                                                | 44.8                                                                                | 36.1                                                                                |                                                                                     | 15.4                                                                                | 15.4                                                                                |                                                                                     | 15.4                                                                                | 15.4                                                                                |                                                                                     |
| Actuated g/C Ratio      | 0.61                                                                                | 0.49                                                                                | 0.49                                                                                | 0.61                                                                                | 0.49                                                                                |                                                                                     | 0.21                                                                                | 0.21                                                                                |                                                                                     | 0.21                                                                                | 0.21                                                                                |                                                                                     |
| v/c Ratio               | 0.06                                                                                | 0.66                                                                                | 0.18                                                                                | 0.47                                                                                | 0.72                                                                                |                                                                                     | 0.81                                                                                | 0.34                                                                                |                                                                                     | 0.17                                                                                | 0.11                                                                                |                                                                                     |
| Control Delay           | 3.9                                                                                 | 17.4                                                                                | 3.1                                                                                 | 8.1                                                                                 | 19.2                                                                                |                                                                                     | 55.0                                                                                | 8.7                                                                                 |                                                                                     | 31.0                                                                                | 12.3                                                                                |                                                                                     |
| Queue Delay             | 0.0                                                                                 | 0.0                                                                                 | 0.0                                                                                 | 0.0                                                                                 | 0.0                                                                                 |                                                                                     | 0.0                                                                                 | 0.0                                                                                 |                                                                                     | 0.0                                                                                 | 0.0                                                                                 |                                                                                     |
| Total Delay             | 3.9                                                                                 | 17.4                                                                                | 3.1                                                                                 | 8.1                                                                                 | 19.2                                                                                |                                                                                     | 55.0                                                                                | 8.7                                                                                 |                                                                                     | 31.0                                                                                | 12.3                                                                                |                                                                                     |
| LOS                     | A                                                                                   | B                                                                                   | A                                                                                   | A                                                                                   | B                                                                                   |                                                                                     | D                                                                                   | A                                                                                   |                                                                                     | C                                                                                   | B                                                                                   |                                                                                     |
| Approach Delay          |                                                                                     | 14.3                                                                                |                                                                                     |                                                                                     | 16.6                                                                                |                                                                                     |                                                                                     | 36.4                                                                                |                                                                                     |                                                                                     | 22.0                                                                                |                                                                                     |
| Approach LOS            |                                                                                     | B                                                                                   |                                                                                     |                                                                                     | B                                                                                   |                                                                                     |                                                                                     | D                                                                                   |                                                                                     |                                                                                     | C                                                                                   |                                                                                     |
| Queue Length 50th (ft)  | 3                                                                                   | 193                                                                                 | 5                                                                                   | 29                                                                                  | 219                                                                                 |                                                                                     | 103                                                                                 | 2                                                                                   |                                                                                     | 16                                                                                  | 1                                                                                   |                                                                                     |
| Queue Length 95th (ft)  | 8                                                                                   | 305                                                                                 | 30                                                                                  | 49                                                                                  | 347                                                                                 |                                                                                     | #280                                                                                | 54                                                                                  |                                                                                     | 52                                                                                  | 28                                                                                  |                                                                                     |
| Internal Link Dist (ft) |                                                                                     | 717                                                                                 |                                                                                     |                                                                                     | 883                                                                                 |                                                                                     |                                                                                     | 518                                                                                 |                                                                                     |                                                                                     | 548                                                                                 |                                                                                     |
| Turn Bay Length (ft)    | 125                                                                                 |                                                                                     | 125                                                                                 | 150                                                                                 |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     | 75                                                                                  |                                                                                     |                                                                                     |
| Base Capacity (vph)     | 506                                                                                 | 1327                                                                                | 1135                                                                                | 547                                                                                 | 1317                                                                                |                                                                                     | 290                                                                                 | 460                                                                                 |                                                                                     | 252                                                                                 | 370                                                                                 |                                                                                     |
| Starvation Cap Reductn  | 0                                                                                   | 0                                                                                   | 0                                                                                   | 0                                                                                   | 0                                                                                   |                                                                                     | 0                                                                                   | 0                                                                                   |                                                                                     | 0                                                                                   | 0                                                                                   |                                                                                     |
| Spillback Cap Reductn   | 0                                                                                   | 0                                                                                   | 0                                                                                   | 0                                                                                   | 0                                                                                   |                                                                                     | 0                                                                                   | 0                                                                                   |                                                                                     | 0                                                                                   | 0                                                                                   |                                                                                     |
| Storage Cap Reductn     | 0                                                                                   | 0                                                                                   | 0                                                                                   | 0                                                                                   | 0                                                                                   |                                                                                     | 0                                                                                   | 0                                                                                   |                                                                                     | 0                                                                                   | 0                                                                                   |                                                                                     |
| Reduced v/c Ratio       | 0.04                                                                                | 0.46                                                                                | 0.13                                                                                | 0.38                                                                                | 0.51                                                                                |                                                                                     | 0.81                                                                                | 0.34                                                                                |                                                                                     | 0.17                                                                                | 0.11                                                                                |                                                                                     |

| Intersection Summary                                            |                        |
|-----------------------------------------------------------------|------------------------|
| Area Type:                                                      | Other                  |
| Cycle Length: 91                                                |                        |
| Actuated Cycle Length: 73.6                                     |                        |
| Natural Cycle: 60                                               |                        |
| Control Type: Actuated-Uncoordinated                            |                        |
| Maximum v/c Ratio: 0.81                                         |                        |
| Intersection Signal Delay: 19.6                                 | Intersection LOS: B    |
| Intersection Capacity Utilization 73.0%                         | ICU Level of Service D |
| Analysis Period (min) 15                                        |                        |
| # 95th percentile volume exceeds capacity, queue may be longer. |                        |
| Queue shown is maximum after two cycles.                        |                        |

Splits and Phases: 19: Wells Avenue/JCC Driveway & Nahanton Street



12239.00 :: Needham Street  
20: Highland Avenue & Riverside Street

2025 Build Conditions with Shuttle Service  
Timing Plan: Saturday MIDDAY

| Intersection             |        |       |        |       |      |      |
|--------------------------|--------|-------|--------|-------|------|------|
| Int Delay, s/veh         | 0.3    |       |        |       |      |      |
| Movement                 | NWL    | NWR   | NET    | NER   | SWL  | SWT  |
| Lane Configurations      | ↔      |       | ↔      |       |      | ↔    |
| Traffic Vol, veh/h       | 5      | 10    | 970    | 2     | 5    | 1130 |
| Future Vol, veh/h        | 5      | 10    | 970    | 2     | 5    | 1130 |
| Conflicting Peds, #/hr   | 0      | 0     | 0      | 5     | 5    | 0    |
| Sign Control             | Stop   | Stop  | Free   | Free  | Free | Free |
| RT Channelized           | -      | None  | -      | None  | -    | None |
| Storage Length           | 0      | -     | -      | -     | -    | -    |
| Veh in Median Storage, # | 0      | -     | 0      | -     | -    | 0    |
| Grade, %                 | 0      | -     | 0      | -     | -    | 0    |
| Peak Hour Factor         | 92     | 92    | 92     | 92    | 92   | 92   |
| Heavy Vehicles, %        | 0      | 0     | 0      | 0     | 0    | 0    |
| Mvmt Flow                | 5      | 11    | 1054   | 2     | 5    | 1228 |
| Major/Minor              |        |       |        |       |      |      |
| Minor1                   | Major1 |       | Major2 |       |      |      |
| Conflicting Flow All     | 2299   | 533   | 0      | 0     | 1062 | 0    |
| Stage 1                  | 1060   | -     | -      | -     | -    | -    |
| Stage 2                  | 1239   | -     | -      | -     | -    | -    |
| Critical Hdwy            | 6.6    | 6.9   | -      | -     | 4.1  | -    |
| Critical Hdwy Stg 1      | 5.8    | -     | -      | -     | -    | -    |
| Critical Hdwy Stg 2      | 5.4    | -     | -      | -     | -    | -    |
| Follow-up Hdwy           | 3.5    | 3.3   | -      | -     | 2.2  | -    |
| Pot Cap-1 Maneuver       | 38     | 496   | -      | -     | 664  | -    |
| Stage 1                  | 299    | -     | -      | -     | -    | -    |
| Stage 2                  | 276    | -     | -      | -     | -    | -    |
| Platoon blocked, %       |        |       | -      | -     | -    | -    |
| Mov Cap-1 Maneuver       | 37     | 494   | -      | -     | 664  | -    |
| Mov Cap-2 Maneuver       | 37     | -     | -      | -     | -    | -    |
| Stage 1                  | 298    | -     | -      | -     | -    | -    |
| Stage 2                  | 269    | -     | -      | -     | -    | -    |
| Approach                 |        |       |        |       |      |      |
| NW                       | NE     |       | SW     |       |      |      |
| HCM Control Delay, s     | 49.5   | 0     |        | 0     |      |      |
| HCM LOS                  | E      |       |        |       |      |      |
| Minor Lane/Major Mvmt    |        |       |        |       |      |      |
| NET                      | NER    | NWLn1 | SWL    | SWT   |      |      |
| Capacity (veh/h)         | -      | -     | 97     | 664   | -    | -    |
| HCM Lane V/C Ratio       | -      | -     | 0.168  | 0.008 | -    | -    |
| HCM Control Delay (s)    | -      | -     | 49.5   | 10.5  | 0    | -    |
| HCM Lane LOS             | -      | -     | E      | B     | A    | -    |
| HCM 95th %ile Q(veh)     | -      | -     | 0.6    | 0     | -    | -    |

12239.00 :: Needham Street  
21: Highland Avenue & Highland Terrace/Highland Circle

2025 Build Conditions with Shuttle Service  
Timing Plan: Saturday MIDDAY

| Intersection             |        |      |        |       |        |       |      |      |      |      |      |      |
|--------------------------|--------|------|--------|-------|--------|-------|------|------|------|------|------|------|
| Int Delay, s/veh         | 0.9    |      |        |       |        |       |      |      |      |      |      |      |
| Movement                 | SEL    | SET  | SER    | NWL   | NWT    | NWR   | NEL  | NET  | NER  | SWL  | SWT  | SWR  |
| Lane Configurations      |        | ↔    |        |       | ↔      |       |      | ↔    |      |      | ↔    |      |
| Traffic Vol, veh/h       | 5      | 0    | 10     | 10    | 0      | 5     | 10   | 960  | 10   | 2    | 1130 | 2    |
| Future Vol, veh/h        | 5      | 0    | 10     | 10    | 0      | 5     | 10   | 960  | 10   | 2    | 1130 | 2    |
| Conflicting Peds, #/hr   | 0      | 0    | 0      | 0     | 0      | 0     | 1    | 0    | 6    | 6    | 0    | 1    |
| Sign Control             | Stop   | Stop | Stop   | Stop  | Stop   | Stop  | Free | Free | Free | Free | Free | Free |
| RT Channelized           | -      | -    | None   | -     | -      | None  | -    | -    | None | -    | -    | None |
| Storage Length           | -      | -    | -      | -     | -      | -     | -    | -    | -    | -    | -    | -    |
| Veh in Median Storage, # | -      | 0    | -      | -     | 0      | -     | -    | 0    | -    | -    | 0    | -    |
| Grade, %                 | -      | 0    | -      | -     | 0      | -     | -    | 0    | -    | -    | 0    | -    |
| Peak Hour Factor         | 92     | 92   | 92     | 92    | 92     | 92    | 92   | 92   | 92   | 92   | 92   | 92   |
| Heavy Vehicles, %        | 0      | 0    | 0      | 0     | 0      | 0     | 1    | 1    | 1    | 0    | 0    | 0    |
| Mvmt Flow                | 5      | 0    | 11     | 11    | 0      | 5     | 11   | 1043 | 11   | 2    | 1228 | 2    |
| Major/Minor              |        |      |        |       |        |       |      |      |      |      |      |      |
| Minor2                   | Minor1 |      | Major1 |       | Major2 |       |      |      |      |      |      |      |
| Conflicting Flow All     | 1778   | 2317 | 616    | 1695  | 2313   | 533   | 1231 | 0    | 0    | 1060 | 0    | 0    |
| Stage 1                  | 1235   | 1235 | -      | 1077  | 1077   | -     | -    | -    | -    | -    | -    | -    |
| Stage 2                  | 543    | 1082 | -      | 618   | 1236   | -     | -    | -    | -    | -    | -    | -    |
| Critical Hdwy            | 7.5    | 6.5  | 6.9    | 7.5   | 6.5    | 6.9   | 4.12 | -    | -    | 4.1  | -    | -    |
| Critical Hdwy Stg 1      | 6.5    | 5.5  | -      | 6.5   | 5.5    | -     | -    | -    | -    | -    | -    | -    |
| Critical Hdwy Stg 2      | 6.5    | 5.5  | -      | 6.5   | 5.5    | -     | -    | -    | -    | -    | -    | -    |
| Follow-up Hdwy           | 3.5    | 4    | 3.3    | 3.5   | 4      | 3.3   | 2.21 | -    | -    | 2.2  | -    | -    |
| Pot Cap-1 Maneuver       | 53     | 38   | 438    | 61    | 38     | 496   | 567  | -    | -    | 665  | -    | -    |
| Stage 1                  | 190    | 251  | -      | 237   | 298    | -     | -    | -    | -    | -    | -    | -    |
| Stage 2                  | 497    | 296  | -      | 448   | 250    | -     | -    | -    | -    | -    | -    | -    |
| Platoon blocked, %       |        |      |        |       |        |       |      | -    | -    | -    | -    | -    |
| Mov Cap-1 Maneuver       | 50     | 36   | 438    | 57    | 36     | 494   | 567  | -    | -    | 665  | -    | -    |
| Mov Cap-2 Maneuver       | 50     | 36   | -      | 57    | 36     | -     | -    | -    | -    | -    | -    | -    |
| Stage 1                  | 181    | 248  | -      | 225   | 283    | -     | -    | -    | -    | -    | -    | -    |
| Stage 2                  | 468    | 281  | -      | 433   | 247    | -     | -    | -    | -    | -    | -    | -    |
| Approach                 |        |      |        |       |        |       |      |      |      |      |      |      |
| SE                       | NW     |      | NE     |       | SW     |       |      |      |      |      |      |      |
| HCM Control Delay, s     | 39     |      | 60.3   |       | 0.4    |       |      |      |      | 0.1  |      |      |
| HCM LOS                  | E      |      | F      |       |        |       |      |      |      |      |      |      |
| Minor Lane/Major Mvmt    |        |      |        |       |        |       |      |      |      |      |      |      |
| NEL                      | NET    | NER  | NWLn1  | SELn1 | SWL    | SWT   | SWR  |      |      |      |      |      |
| Capacity (veh/h)         | 567    | -    | -      | 81    | 122    | 665   | -    | -    | -    | -    | -    | -    |
| HCM Lane V/C Ratio       | 0.019  | -    | -      | 0.201 | 0.134  | 0.003 | -    | -    | -    | -    | -    | -    |
| HCM Control Delay (s)    | 11.5   | 0.3  | -      | 60.3  | 39     | 10.4  | 0.1  | -    | -    | -    | -    | -    |
| HCM Lane LOS             | B      | A    | -      | F     | E      | B     | A    | -    | -    | -    | -    | -    |
| HCM 95th %ile Q(veh)     | 0.1    | -    | -      | 0.7   | 0.4    | 0     | -    | -    | -    | -    | -    | -    |

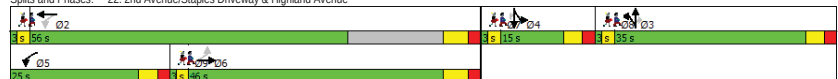
12239.00 :: Needham Street  
22: 2nd Avenue/Staples Driveway & Highland Avenue

2025 Build Conditions with Shuttle Service  
Timing Plan: Saturday MIDDAY

| Lane Group              | EBL                                                                               | EBT                                                                               | EBR  | WBL   | WBT                                                                               | WBR                                                                               | NBL   | NBT                                                                               | NBR                                                                               | SBL   | SBT                                                                               | SBR                                                                               | Ø1   | Ø7   | Ø8   | Ø9   |
|-------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|------|-------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|------|------|------|------|
| Lane Configurations     |  |  |      |       |  |  |       |  |  |       |  |  |      |      |      |      |
| Traffic Volume (vph)    | 15                                                                                | 735                                                                               | 145  | 155   | 960                                                                               | 40                                                                                | 140   | 15                                                                                | 175                                                                               | 70    | 10                                                                                | 15                                                                                |      |      |      |      |
| Future Volume (vph)     | 15                                                                                | 735                                                                               | 145  | 155   | 960                                                                               | 40                                                                                | 140   | 15                                                                                | 175                                                                               | 70    | 10                                                                                | 15                                                                                |      |      |      |      |
| Ideal Flow (vphpl)      | 1900                                                                              | 1900                                                                              | 1900 | 1900  | 1900                                                                              | 1900                                                                              | 1900  | 1900                                                                              | 1900                                                                              | 1900  | 1900                                                                              | 1900                                                                              |      |      |      |      |
| Storage Length (ft)     | 100                                                                               |                                                                                   | 0    | 100   |                                                                                   | 0                                                                                 | 150   |                                                                                   | 100                                                                               |       | 0                                                                                 | 50                                                                                |      |      |      |      |
| Storage Lanes           | 1                                                                                 |                                                                                   | 0    |       |                                                                                   | 0                                                                                 | 1     |                                                                                   |                                                                                   |       | 1                                                                                 |                                                                                   |      |      |      |      |
| Taper Length (ft)       | 25                                                                                |                                                                                   |      | 25    |                                                                                   |                                                                                   | 25    |                                                                                   |                                                                                   |       | 25                                                                                |                                                                                   |      |      |      |      |
| Satd. Flow (prot)       | 1787                                                                              | 3461                                                                              | 0    | 0     | 3563                                                                              | 0                                                                                 | 1698  | 1717                                                                              | 1599                                                                              | 0     | 1820                                                                              | 1615                                                                              |      |      |      |      |
| Flt Permitted           | 0.161                                                                             |                                                                                   |      |       | 0.622                                                                             |                                                                                   | 0.950 | 0.961                                                                             |                                                                                   |       | 0.958                                                                             |                                                                                   |      |      |      |      |
| Satd. Flow (perm)       | 302                                                                               | 3461                                                                              | 0    | 0     | 2232                                                                              | 0                                                                                 | 1698  | 1717                                                                              | 1573                                                                              | 0     | 1814                                                                              | 1591                                                                              |      |      |      |      |
| Right Turn on Red       |                                                                                   |                                                                                   | Yes  |       |                                                                                   | Yes                                                                               |       | Yes                                                                               |                                                                                   |       | Yes                                                                               |                                                                                   |      |      |      |      |
| Satd. Flow (RTOR)       | 18                                                                                |                                                                                   |      |       | 4                                                                                 |                                                                                   |       | 190                                                                               |                                                                                   |       | 176                                                                               |                                                                                   |      |      |      |      |
| Link Speed (mph)        | 30                                                                                |                                                                                   |      |       | 30                                                                                |                                                                                   |       | 30                                                                                |                                                                                   |       | 30                                                                                |                                                                                   |      |      |      |      |
| Link Distance (ft)      | 210                                                                               |                                                                                   |      |       | 361                                                                               |                                                                                   |       | 859                                                                               |                                                                                   |       | 290                                                                               |                                                                                   |      |      |      |      |
| Travel Time (s)         | 4.8                                                                               |                                                                                   |      |       | 8.2                                                                               |                                                                                   |       | 19.5                                                                              |                                                                                   |       | 6.6                                                                               |                                                                                   |      |      |      |      |
| Confl. Peds. (#/hr)     | 3                                                                                 |                                                                                   | 8    | 8     |                                                                                   | 3                                                                                 |       |                                                                                   | 2                                                                                 | 2     |                                                                                   |                                                                                   |      |      |      |      |
| Confl. Bikes (#/hr)     |                                                                                   |                                                                                   | 1    |       |                                                                                   | 1                                                                                 |       |                                                                                   |                                                                                   |       | 1                                                                                 |                                                                                   |      |      |      |      |
| Peak Hour Factor        | 0.92                                                                              | 0.92                                                                              | 0.92 | 0.92  | 0.92                                                                              | 0.92                                                                              | 0.92  | 0.92                                                                              | 0.92                                                                              | 0.92  | 0.92                                                                              | 0.92                                                                              |      |      |      |      |
| Heavy Vehicles (%)      | 1%                                                                                | 1%                                                                                | 1%   | 0%    | 0%                                                                                | 0%                                                                                | 1%    | 1%                                                                                | 1%                                                                                | 0%    | 0%                                                                                | 0%                                                                                |      |      |      |      |
| Shared Lane Traffic (%) |                                                                                   |                                                                                   |      |       |                                                                                   |                                                                                   | 45%   |                                                                                   |                                                                                   |       |                                                                                   |                                                                                   |      |      |      |      |
| Lane Group Flow (vph)   | 16                                                                                | 957                                                                               | 0    | 0     | 1254                                                                              | 0                                                                                 | 84    | 84                                                                                | 190                                                                               | 0     | 87                                                                                | 16                                                                                |      |      |      |      |
| Turn Type               | Perm                                                                              | NA                                                                                |      | pm+pt | NA                                                                                |                                                                                   | Split | NA                                                                                | Perm                                                                              | Split | NA                                                                                | Perm                                                                              |      |      |      |      |
| Protected Phases        | 6                                                                                 |                                                                                   | 5    | 2     |                                                                                   | 3                                                                                 | 3     |                                                                                   | 4                                                                                 | 4     |                                                                                   |                                                                                   | 1    | 7    | 8    | 9    |
| Permitted Phases        | 6                                                                                 |                                                                                   | 2    |       |                                                                                   |                                                                                   |       | 3                                                                                 |                                                                                   |       | 4                                                                                 |                                                                                   |      |      |      |      |
| Detector Phase          | 6                                                                                 | 6                                                                                 | 5    | 2     |                                                                                   | 3                                                                                 | 3     | 3                                                                                 | 4                                                                                 | 4     | 4                                                                                 |                                                                                   |      |      |      |      |
| Switch Phase            |                                                                                   |                                                                                   |      |       |                                                                                   |                                                                                   |       |                                                                                   |                                                                                   |       |                                                                                   |                                                                                   |      |      |      |      |
| Minimum Initial (s)     | 15.0                                                                              | 15.0                                                                              |      | 4.0   | 15.0                                                                              |                                                                                   | 10.0  | 10.0                                                                              | 10.0                                                                              | 4.0   | 4.0                                                                               | 4.0                                                                               | 1.0  | 1.0  | 1.0  | 1.0  |
| Minimum Split (s)       | 31.0                                                                              | 31.0                                                                              |      | 9.0   | 23.0                                                                              |                                                                                   | 23.0  | 23.0                                                                              | 23.0                                                                              | 26.0  | 26.0                                                                              | 26.0                                                                              | 3.0  | 3.0  | 3.0  | 3.0  |
| Total Split (s)         | 46.0                                                                              | 46.0                                                                              |      | 25.0  | 56.0                                                                              |                                                                                   | 35.0  | 35.0                                                                              | 35.0                                                                              | 15.0  | 15.0                                                                              | 15.0                                                                              | 3.0  | 3.0  | 3.0  | 3.0  |
| Total Split (%)         | 35.4%                                                                             | 35.4%                                                                             |      | 19.2% | 43.1%                                                                             |                                                                                   | 26.9% | 26.9%                                                                             | 26.9%                                                                             | 11.5% | 11.5%                                                                             | 11.5%                                                                             | 2%   | 2%   | 2%   | 2%   |
| Yellow Time (s)         | 4.0                                                                               | 4.0                                                                               |      | 3.0   | 4.0                                                                               |                                                                                   | 3.0   | 3.0                                                                               | 3.0                                                                               | 3.0   | 3.0                                                                               | 3.0                                                                               | 2.0  | 2.0  | 2.0  | 2.0  |
| All-Red Time (s)        | 2.0                                                                               | 2.0                                                                               |      | 2.0   | 2.0                                                                               |                                                                                   | 2.0   | 2.0                                                                               | 2.0                                                                               | 2.0   | 2.0                                                                               | 2.0                                                                               | 0.0  | 0.0  | 0.0  | 0.0  |
| Lost Time Adjust (s)    | 0.0                                                                               | 0.0                                                                               |      |       |                                                                                   |                                                                                   | 0.0   | 0.0                                                                               | 0.0                                                                               |       | 0.0                                                                               | 0.0                                                                               |      |      |      |      |
| Total Lost Time (s)     | 6.0                                                                               | 6.0                                                                               |      |       |                                                                                   |                                                                                   | 5.0   | 5.0                                                                               | 5.0                                                                               |       | 5.0                                                                               | 5.0                                                                               |      |      |      |      |
| Lead/Lag                |                                                                                   |                                                                                   |      | Lead  | Lag                                                                               |                                                                                   | Lag   | Lag                                                                               | Lag                                                                               | Lag   | Lag                                                                               | Lag                                                                               | Lead | Lead | Lead | Lag  |
| Lead-Lag Optimize?      |                                                                                   |                                                                                   |      |       |                                                                                   |                                                                                   |       |                                                                                   |                                                                                   |       |                                                                                   |                                                                                   |      |      |      |      |
| Recall Mode             | None                                                                              | None                                                                              |      | None  | None                                                                              |                                                                                   | None  | None                                                                              | None                                                                              | None  | None                                                                              | None                                                                              | None | None | None | None |
| Act Effect Green (s)    | 50.6                                                                              | 50.6                                                                              |      | 50.6  | 50.6                                                                              |                                                                                   | 11.5  | 11.5                                                                              | 11.5                                                                              | 8.3   | 8.3                                                                               |                                                                                   |      |      |      |      |
| Actuated g/C Ratio      | 0.60                                                                              | 0.60                                                                              |      | 0.60  | 0.14                                                                              | 0.14                                                                              | 0.14  | 0.14                                                                              | 0.10                                                                              | 0.10  |                                                                                   |                                                                                   |      |      |      |      |
| v/c Ratio               | 0.09                                                                              | 0.46                                                                              |      | 0.94  | 0.37                                                                              | 0.36                                                                              | 0.51  |                                                                                   | 0.49                                                                              | 0.05  |                                                                                   |                                                                                   |      |      |      |      |
| Control Delay           | 12.3                                                                              | 11.8                                                                              |      | 33.7  | 40.2                                                                              | 40.1                                                                              | 10.7  |                                                                                   | 48.5                                                                              | 0.3   |                                                                                   |                                                                                   |      |      |      |      |
| Queue Delay             | 0.0                                                                               | 0.0                                                                               |      | 0.0   | 0.0                                                                               | 0.0                                                                               | 0.0   |                                                                                   | 0.0                                                                               | 0.0   |                                                                                   |                                                                                   |      |      |      |      |
| Total Delay             | 12.3                                                                              | 11.8                                                                              |      | 33.7  | 40.2                                                                              | 40.1                                                                              | 10.7  |                                                                                   | 48.5                                                                              | 0.3   |                                                                                   |                                                                                   |      |      |      |      |
| LOS                     | B                                                                                 | B                                                                                 |      | C     | D                                                                                 | D                                                                                 | D     |                                                                                   | D                                                                                 | A     |                                                                                   |                                                                                   |      |      |      |      |
| Approach Delay          | 11.8                                                                              |                                                                                   |      | 33.7  |                                                                                   |                                                                                   | 24.5  |                                                                                   |                                                                                   | 41.0  |                                                                                   |                                                                                   |      |      |      |      |
| Approach LOS            | B                                                                                 |                                                                                   |      | C     |                                                                                   |                                                                                   | C     |                                                                                   |                                                                                   | D     |                                                                                   |                                                                                   |      |      |      |      |
| Queue Length 50th (ft)  | 3                                                                                 | 135                                                                               |      | 298   |                                                                                   | 44                                                                                | 44    | 0                                                                                 |                                                                                   | 44    | 0                                                                                 |                                                                                   |      |      |      |      |
| Queue Length 95th (ft)  | 18                                                                                | 267                                                                               |      | #625  |                                                                                   | 95                                                                                | 95    | 58                                                                                |                                                                                   | 103   | 0                                                                                 |                                                                                   |      |      |      |      |
| Internal Link Dist (ft) |                                                                                   | 130                                                                               |      | 281   |                                                                                   |                                                                                   | 779   |                                                                                   |                                                                                   | 210   |                                                                                   |                                                                                   |      |      |      |      |
| Turn Bay Length (ft)    | 100                                                                               |                                                                                   |      |       | 150                                                                               |                                                                                   | 100   |                                                                                   |                                                                                   | 50    |                                                                                   |                                                                                   |      |      |      |      |
| Base Capacity (vph)     | 179                                                                               | 2067                                                                              |      | 1766  | 606                                                                               | 613                                                                               | 684   |                                                                                   | 216                                                                               | 344   |                                                                                   |                                                                                   |      |      |      |      |
| Starvation Cap Reductn  | 0                                                                                 | 0                                                                                 |      | 0     | 0                                                                                 | 0                                                                                 | 0     |                                                                                   | 0                                                                                 | 0     |                                                                                   |                                                                                   |      |      |      |      |
| Spillback Cap Reductn   | 0                                                                                 | 0                                                                                 |      | 0     | 0                                                                                 | 0                                                                                 | 0     |                                                                                   | 0                                                                                 | 0     |                                                                                   |                                                                                   |      |      |      |      |
| Storage Cap Reductn     | 0                                                                                 | 0                                                                                 |      | 0     | 0                                                                                 | 0                                                                                 | 0     |                                                                                   | 0                                                                                 | 0     |                                                                                   |                                                                                   |      |      |      |      |
| Reduced v/c Ratio       | 0.09                                                                              | 0.46                                                                              |      | 0.71  | 0.14                                                                              | 0.14                                                                              | 0.28  |                                                                                   | 0.40                                                                              | 0.05  |                                                                                   |                                                                                   |      |      |      |      |

| Intersection Summary                                            |                        |
|-----------------------------------------------------------------|------------------------|
| Area Type:                                                      | Other                  |
| Cycle Length:                                                   | 130                    |
| Actuated Cycle Length:                                          | 85                     |
| Natural Cycle:                                                  | 150                    |
| Control Type:                                                   | Actuated-Uncoordinated |
| Maximum v/c Ratio:                                              | 0.94                   |
| Intersection Signal Delay:                                      | 24.8                   |
| Intersection Capacity Utilization:                              | 82.8%                  |
| ICU Level of Service:                                           | E                      |
| Analysis Period (min):                                          | 15                     |
| # 95th percentile volume exceeds capacity, queue may be longer. |                        |
| Queue shown is maximum after two cycles.                        |                        |

Splits and Phases: 22: 2nd Avenue/Staples Driveway & Highland Avenue



12239.00 :: Needham Street  
23: Highland Avenue & Charles Street

2025 Build Conditions with Shuttle Service  
Timing Plan: Saturday MIDDAY

| Intersection             |                                                                                     |                                                                                     |                                                                                     |        |                                                                                     |                                                                                     |
|--------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|--------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
| Int Delay, s/veh         | 5.3                                                                                 |                                                                                     |                                                                                     |        |                                                                                     |                                                                                     |
| Movement                 | EBL                                                                                 | EBT                                                                                 | WBT                                                                                 | WBR    | SBL                                                                                 | SBR                                                                                 |
| Lane Configurations      |  |  |  |        |  |  |
| Traffic Vol, veh/h       | 45                                                                                  | 860                                                                                 | 1095                                                                                | 20     | 35                                                                                  | 110                                                                                 |
| Future Vol, veh/h        | 45                                                                                  | 860                                                                                 | 1095                                                                                | 20     | 35                                                                                  | 110                                                                                 |
| Conflicting Peds, #/hr   | 3                                                                                   | 0                                                                                   | 0                                                                                   | 0      | 3                                                                                   | 0                                                                                   |
| Sign Control             | Free                                                                                | Free                                                                                | Free                                                                                | Free   | Stop                                                                                | Stop                                                                                |
| RT Channelized           | -                                                                                   | None                                                                                | -                                                                                   | None   | -                                                                                   | None                                                                                |
| Storage Length           | 100                                                                                 | -                                                                                   | -                                                                                   | -      | 0                                                                                   | -                                                                                   |
| Veh in Median Storage, # | -                                                                                   | 0                                                                                   | 0                                                                                   | -      | 0                                                                                   | -                                                                                   |
| Grade, %                 | -                                                                                   | 0                                                                                   | 0                                                                                   | -      | 0                                                                                   | -                                                                                   |
| Peak Hour Factor         | 92                                                                                  | 92                                                                                  | 92                                                                                  | 92     | 92                                                                                  | 92                                                                                  |
| Heavy Vehicles, %        | 1                                                                                   | 1                                                                                   | 1                                                                                   | 1      | 0                                                                                   | 0                                                                                   |
| Mvmt Flow                | 49                                                                                  | 935                                                                                 | 1190                                                                                | 22     | 38                                                                                  | 120                                                                                 |
| Major/Minor              |                                                                                     |                                                                                     |                                                                                     |        |                                                                                     |                                                                                     |
|                          | Major1                                                                              | Major2                                                                              |                                                                                     | Minor2 |                                                                                     |                                                                                     |
| Conflicting Flow All     | 1215                                                                                | 0                                                                                   | -                                                                                   | 0      | 1769                                                                                | 609                                                                                 |
| Stage 1                  | -                                                                                   | -                                                                                   | -                                                                                   | -      | 1204                                                                                | -                                                                                   |
| Stage 2                  | -                                                                                   | -                                                                                   | -                                                                                   | -      | 565                                                                                 | -                                                                                   |
| Critical Hdwy            | 4.12                                                                                | -                                                                                   | -                                                                                   | -      | 6.8                                                                                 | 6.9                                                                                 |
| Critical Hdwy Stg 1      | -                                                                                   | -                                                                                   | -                                                                                   | -      | 5.8                                                                                 | -                                                                                   |
| Critical Hdwy Stg 2      | -                                                                                   | -                                                                                   | -                                                                                   | -      | 5.8                                                                                 | -                                                                                   |
| Follow-up Hdwy           | 2.21                                                                                | -                                                                                   | -                                                                                   | -      | 3.5                                                                                 | 3.3                                                                                 |
| Pot Cap-1 Maneuver       | 575                                                                                 | -                                                                                   | -                                                                                   | -      | 76                                                                                  | 443                                                                                 |
| Stage 1                  | -                                                                                   | -                                                                                   | -                                                                                   | -      | 251                                                                                 | -                                                                                   |
| Stage 2                  | -                                                                                   | -                                                                                   | -                                                                                   | -      | 538                                                                                 | -                                                                                   |
| Platoon blocked, %       | -                                                                                   | -                                                                                   | -                                                                                   | -      | -                                                                                   | -                                                                                   |
| Mov Cap-1 Maneuver       | 575                                                                                 | -                                                                                   | -                                                                                   | -      | 69                                                                                  | 442                                                                                 |
| Mov Cap-2 Maneuver       | -                                                                                   | -                                                                                   | -                                                                                   | -      | 69                                                                                  | -                                                                                   |
| Stage 1                  | -                                                                                   | -                                                                                   | -                                                                                   | -      | 250                                                                                 | -                                                                                   |
| Stage 2                  | -                                                                                   | -                                                                                   | -                                                                                   | -      | 491                                                                                 | -                                                                                   |
| Approach                 |                                                                                     |                                                                                     |                                                                                     |        |                                                                                     |                                                                                     |
|                          | EB                                                                                  | WB                                                                                  |                                                                                     | SB     |                                                                                     |                                                                                     |
| HCM Control Delay, s     | 0.6                                                                                 | 0                                                                                   |                                                                                     | 75.9   |                                                                                     |                                                                                     |
| HCM LOS                  |                                                                                     |                                                                                     |                                                                                     | F      |                                                                                     |                                                                                     |
| Minor Lane/Major Mvmt    |                                                                                     |                                                                                     |                                                                                     |        |                                                                                     |                                                                                     |
|                          | EBL                                                                                 | EBT                                                                                 | WBT                                                                                 | WBR    | SBLn1                                                                               |                                                                                     |
| Capacity (veh/h)         | 575                                                                                 | -                                                                                   | -                                                                                   | -      | -                                                                                   | 192                                                                                 |
| HCM Lane V/C Ratio       | 0.085                                                                               | -                                                                                   | -                                                                                   | -      | -                                                                                   | 0.821                                                                               |
| HCM Control Delay (s)    | 11.8                                                                                | -                                                                                   | -                                                                                   | -      | -                                                                                   | 75.9                                                                                |
| HCM Lane LOS             | B                                                                                   | -                                                                                   | -                                                                                   | -      | -                                                                                   | F                                                                                   |
| HCM 95th %ile Q(veh)     | 0.3                                                                                 | -                                                                                   | -                                                                                   | -      | -                                                                                   | 5.8                                                                                 |

12239.00 :: Needham Street  
24: Highland Avenue & Wexford Street

2025 Build Conditions with Shuttle Service  
Timing Plan: Saturday Midday

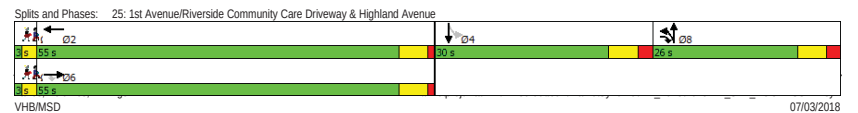
| Intersection             |        |        |      |        |       |       |
|--------------------------|--------|--------|------|--------|-------|-------|
| Int Delay, s/veh         | 17.5   |        |      |        |       |       |
| Movement                 | EBL    | EBT    | WBT  | WBR    | SBL   | SBR   |
| Lane Configurations      | ↰      | ↰↱     | ↰↱   |        | ↰     | ↰     |
| Traffic Vol, veh/h       | 90     | 865    | 1170 | 35     | 40    | 130   |
| Future Vol, veh/h        | 90     | 865    | 1170 | 35     | 40    | 130   |
| Conflicting Peds, #/hr   | 2      | 0      | 0    | 2      | 0     | 0     |
| Sign Control             | Free   | Free   | Free | Free   | Stop  | Stop  |
| RT Channelized           | -      | None   | -    | None   | -     | None  |
| Storage Length           | 100    | -      | -    | -      | 0     | -     |
| Veh in Median Storage, # | -      | 0      | 0    | -      | 0     | -     |
| Grade, %                 | -      | 0      | 0    | -      | 0     | -     |
| Peak Hour Factor         | 92     | 92     | 92   | 92     | 92    | 92    |
| Heavy Vehicles, %        | 0      | 0      | 1    | 1      | 0     | 0     |
| Mvmt Flow                | 98     | 940    | 1272 | 38     | 43    | 141   |
|                          |        |        |      |        |       |       |
| Major/Minor              | Major1 | Major2 |      | Minor2 |       |       |
| Conflicting Flow All     | 1312   | 0      | -    | 0      | 1959  | 657   |
| Stage 1                  | -      | -      | -    | -      | 1293  | -     |
| Stage 2                  | -      | -      | -    | -      | 666   | -     |
| Critical Hdwy            | 4.1    | -      | -    | -      | 6.8   | 6.9   |
| Critical Hdwy Stg 1      | -      | -      | -    | -      | 5.8   | -     |
| Critical Hdwy Stg 2      | -      | -      | -    | -      | 5.8   | -     |
| Follow-up Hdwy           | 2.2    | -      | -    | -      | 3.5   | 3.3   |
| Pot Cap-1 Maneuver       | 534    | -      | -    | -      | 57    | 412   |
| Stage 1                  | -      | -      | -    | -      | 225   | -     |
| Stage 2                  | -      | -      | -    | -      | 478   | -     |
| Platoon blocked, %       | -      | -      | -    | -      | -     | -     |
| Mov Cap-1 Maneuver       | 534    | -      | -    | -      | 46    | 411   |
| Mov Cap-2 Maneuver       | -      | -      | -    | -      | 46    | -     |
| Stage 1                  | -      | -      | -    | -      | 225   | -     |
| Stage 2                  | -      | -      | -    | -      | 390   | -     |
|                          |        |        |      |        |       |       |
| Approach                 | EB     | WB     |      | SB     |       |       |
| HCM Control Delay, s     | 1.2    | 0      |      | 233.6  |       |       |
| HCM LOS                  |        |        | F    |        |       |       |
|                          |        |        |      |        |       |       |
| Minor Lane/Major Mvmt    | EBL    | EBT    | WBT  | WBR    | SBLn1 |       |
| Capacity (veh/h)         | 534    | -      | -    | -      | -     | 143   |
| HCM Lane V/C Ratio       | 0.183  | -      | -    | -      | -     | 1.292 |
| HCM Control Delay (s)    | 13.2   | -      | -    | -      | -     | 233.6 |
| HCM Lane LOS             | B      | -      | -    | -      | -     | F     |
| HCM 95th %tile Q(veh)    | 0.7    | -      | -    | -      | -     | 11.3  |

12239.00 :: Needham Street  
25: 1st Avenue/Riverside Community Care Driveway & Highland Avenue

2025 Build Conditions with Shuttle Service  
Timing Plan: Saturday Midday

| Lane Group              | EBL   | EBT   | EBR  | WBL   | WBT   | WBR   | NBL   | NBT   | NBR   | SBL   | SBT  | SBR  | Ø1   | Ø5 |
|-------------------------|-------|-------|------|-------|-------|-------|-------|-------|-------|-------|------|------|------|----|
| Lane Configurations     | ↰     | ↰↱    | ↰    | ↰     | ↰↱    | ↰     | ↰     | ↰↱    | ↰     | ↰     | ↰↱   | ↰    |      |    |
| Traffic Volume (vph)    | 0     | 860   | 130  | 0     | 1305  | 0     | 195   | 0     | 100   | 0     | 0    | 0    |      |    |
| Future Volume (vph)     | 0     | 860   | 130  | 0     | 1305  | 0     | 195   | 0     | 100   | 0     | 0    | 0    |      |    |
| Ideal Flow (vphpl)      | 1900  | 1900  | 1900 | 1900  | 1900  | 1900  | 1900  | 1900  | 1900  | 1900  | 1900 | 1900 |      |    |
| Storage Length (ft)     | 0     | 0     | 0    | 0     | 0     | 0     | 0     | 0     | 200   | 0     | 0    | 0    |      |    |
| Storage Lanes           | 0     | 1     | 0    | 0     | 0     | 1     | 0     | 0     | 0     | 0     | 0    | 0    |      |    |
| Taper Length (ft)       | 25    |       |      | 25    |       |       | 25    |       |       | 25    |      |      |      |    |
| Satd. Flow (prot)       | 0     | 3610  | 1615 | 0     | 3610  | 0     | 1715  | 1591  | 0     | 0     | 1900 | 0    |      |    |
| Flt Permitted           |       |       |      |       |       |       | 0.950 | 0.986 |       |       |      |      |      |    |
| Satd. Flow (perm)       | 0     | 3610  | 1577 | 0     | 3610  | 0     | 1715  | 1591  | 0     | 0     | 1900 | 0    |      |    |
| Right Turn on Red       |       | Yes   |      |       | Yes   |       |       |       | Yes   |       |      | Yes  |      |    |
| Satd. Flow (RTOR)       |       | 141   |      |       |       |       |       | 96    |       |       |      |      |      |    |
| Link Speed (mph)        | 30    |       |      | 30    |       |       | 30    |       |       | 30    |      |      |      |    |
| Link Distance (ft)      | 377   |       |      | 272   |       |       | 825   |       |       | 147   |      |      |      |    |
| Travel Time (s)         | 8.6   |       |      | 6.2   |       |       | 18.8  |       |       | 3.3   |      |      |      |    |
| Confl. Peds. (#/hr)     |       | 1     | 1    |       |       |       |       |       |       |       |      |      |      |    |
| Confl. Bikes (#/hr)     |       | 1     |      |       |       |       |       |       |       |       |      |      |      |    |
| Peak Hour Factor        | 0.92  | 0.92  | 0.92 | 0.92  | 0.92  | 0.92  | 0.92  | 0.92  | 0.92  | 0.92  | 0.92 | 0.92 |      |    |
| Heavy Vehicles (%)      | 0%    | 0%    | 0%   | 0%    | 0%    | 0%    | 0%    | 0%    | 0%    | 0%    | 0%   | 0%   |      |    |
| Shared Lane Traffic (%) |       |       |      |       |       |       | 21%   |       |       |       |      |      |      |    |
| Lane Group Flow (vph)   | 0     | 935   | 141  | 0     | 1418  | 0     | 167   | 154   | 0     | 0     | 0    | 0    |      |    |
| Turn Type               | NA    | pm+ov | NA   | NA    | Split | NA    |       |       |       |       |      |      |      |    |
| Protected Phases        | 6     | 8     | 2    | 8     | 8     |       | 8     |       |       | 4     |      | 1    | 5    |    |
| Permitted Phases        | 6     |       |      |       |       |       |       |       |       | 4     |      |      |      |    |
| Detector Phase          | 6     | 8     |      | 2     | 8     | 8     |       |       |       | 4     | 4    |      |      |    |
| Switch Phase            |       |       |      |       |       |       |       |       |       |       |      |      |      |    |
| Minimum Initial (s)     | 10.0  | 6.0   |      | 10.0  |       | 6.0   | 6.0   |       | 6.0   | 6.0   |      | 1.0  | 1.0  |    |
| Minimum Split (s)       | 25.0  | 12.0  |      | 16.0  |       | 12.0  | 12.0  |       | 29.0  | 29.0  |      | 3.0  | 3.0  |    |
| Total Split (s)         | 55.0  | 26.0  |      | 55.0  |       | 26.0  | 26.0  |       | 30.0  | 30.0  |      | 3.0  | 3.0  |    |
| Total Split (%)         | 48.2% | 22.8% |      | 48.2% |       | 22.8% | 22.8% |       | 26.3% | 26.3% |      | 3%   | 3%   |    |
| Yellow Time (s)         | 4.0   | 4.0   |      | 4.0   |       | 4.0   | 4.0   |       | 4.0   | 4.0   |      | 2.0  | 2.0  |    |
| All-Red Time (s)        | 1.0   | 2.0   |      | 1.0   |       | 2.0   | 2.0   |       | 2.0   | 2.0   |      | 0.0  | 0.0  |    |
| Lost Time Adjust (s)    | 0.0   | 0.0   |      | 0.0   |       | 0.0   | 0.0   |       | 0.0   | 0.0   |      |      |      |    |
| Total Lost Time (s)     | 5.0   | 6.0   |      | 5.0   |       | 6.0   | 6.0   |       | 6.0   | 6.0   |      |      |      |    |
| Lead/Lag                | Lag   |       |      | Lag   |       |       |       |       |       |       |      | Lead | Lead |    |
| Lead-Lag Optimize?      | Yes   |       |      | Yes   |       |       |       |       |       |       |      | Yes  | Yes  |    |
| Recall Mode             | Min   | None  |      | Min   |       | None  | None  |       | None  | None  |      | None | None |    |
| Act Effct Green (s)     | 30.1  | 40.4  |      | 30.6  |       | 11.3  | 11.3  |       |       |       |      |      |      |    |
| Actuated g/C Ratio      | 0.56  | 0.76  |      | 0.57  |       | 0.21  | 0.21  |       |       |       |      |      |      |    |
| v/c Ratio               | 0.46  | 0.11  |      | 0.69  |       | 0.46  | 0.37  |       |       |       |      |      |      |    |
| Control Delay           | 8.0   | 0.4   |      | 10.1  |       | 24.9  | 12.4  |       |       |       |      |      |      |    |
| Queue Delay             | 0.0   | 0.0   |      | 0.0   |       | 0.0   | 0.0   |       |       |       |      |      |      |    |
| Total Delay             | 8.0   | 0.4   |      | 10.1  |       | 24.9  | 12.4  |       |       |       |      |      |      |    |
| LOS                     | A     | A     |      | B     |       | C     | B     |       |       |       |      |      |      |    |
| Approach Delay          | 7.0   |       |      | 10.1  |       |       | 18.9  |       |       |       |      |      |      |    |
| Approach LOS            | A     |       |      | B     |       |       | B     |       |       |       |      |      |      |    |
| Queue Length 50th (ft)  | 75    | 0     |      | 139   |       | 47    | 15    |       |       |       |      |      |      |    |
| Queue Length 95th (ft)  | 156   | 3     |      | 249   |       | 121   | 68    |       |       |       |      |      |      |    |
| Internal Link Dist (ft) | 297   |       |      | 192   |       |       | 745   |       |       | 67    |      |      |      |    |
| Turn Bay Length (ft)    |       |       |      |       |       |       |       |       |       |       |      |      |      |    |
| Base Capacity (vph)     | 3245  | 1399  |      | 3245  |       | 672   | 681   |       |       |       |      |      |      |    |
| Starvation Cap Reductn  | 0     | 0     |      | 0     |       | 0     | 0     |       |       |       |      |      |      |    |
| Spillback Cap Reductn   | 0     | 0     |      | 0     |       | 0     | 0     |       |       |       |      |      |      |    |
| Storage Cap Reductn     | 0     | 0     |      | 0     |       | 0     | 0     |       |       |       |      |      |      |    |
| Reduced v/c Ratio       | 0.29  | 0.10  |      | 0.44  |       | 0.25  | 0.23  |       |       |       |      |      |      |    |

| Intersection Summary                    |                        |
|-----------------------------------------|------------------------|
| Area Type:                              | Other                  |
| Cycle Length: 114                       |                        |
| Actuated Cycle Length: 53.4             |                        |
| Natural Cycle: 90                       |                        |
| Control Type: Actuated-Uncoordinated    |                        |
| Maximum v/c Ratio: 0.69                 |                        |
| Intersection Signal Delay: 9.9          | Intersection LOS: A    |
| Intersection Capacity Utilization 53.7% | ICU Level of Service A |
| Analysis Period (min) 15                |                        |



12239.00 :: Needham Street  
26: I-95 NB Ramps & Highland Avenue

2025 Build Conditions with Shuttle Service  
Timing Plan: Saturday MIDDAY

| Intersection             |        |      |       |        |      |       |        |       |       |        |      |       |
|--------------------------|--------|------|-------|--------|------|-------|--------|-------|-------|--------|------|-------|
| Int Delay, s/veh         |        |      |       |        |      |       |        |       |       |        |      |       |
| 1.7                      |        |      |       |        |      |       |        |       |       |        |      |       |
| Movement                 | EBL    | EBT  | EBR   | WBL    | WBT  | WBR   | NBL    | NBT   | NBR   | SBL    | SBT  | SBR   |
| Lane Configurations      |        | ↕↕   | ↕     |        | ↕↕   |       |        |       | ↕     |        |      | ↕     |
| Traffic Vol, veh/h       | 0      | 750  | 395   | 0      | 965  | 535   | 0      | 0     | 240   | 0      | 0    | 85    |
| Future Vol, veh/h        | 0      | 750  | 395   | 0      | 965  | 535   | 0      | 0     | 240   | 0      | 0    | 85    |
| Conflicting Peds, #/hr   | 0      | 0    | 2     | 0      | 0    | 0     | 0      | 0     | 2     | 0      | 0    | 0     |
| Sign Control             | Free   | Free | Free  | Free   | Free | Free  | Stop   | Stop  | Stop  | Stop   | Stop | Stop  |
| RT Channelized           | -      | -    | Yield | -      | -    | Yield | -      | -     | Yield | -      | -    | Yield |
| Storage Length           | -      | -    | 0     | -      | -    | -     | -      | -     | 0     | -      | -    | 0     |
| Veh in Median Storage, # | -      | 0    | -     | -      | 0    | -     | -      | 0     | -     | -      | 0    | -     |
| Grade, %                 | -      | 0    | -     | -      | 0    | -     | -      | 0     | -     | -      | 0    | -     |
| Peak Hour Factor         | 92     | 92   | 92    | 92     | 92   | 92    | 92     | 92    | 92    | 92     | 92   | 92    |
| Heavy Vehicles, %        | 0      | 0    | 0     | 1      | 1    | 1     | 1      | 1     | 1     | 0      | 0    | 0     |
| Mvmt Flow                | 0      | 815  | 429   | 0      | 1049 | 582   | 0      | 0     | 261   | 0      | 0    | 92    |
| Major/Minor              | Major1 |      |       | Major2 |      |       | Minor1 |       |       | Minor2 |      |       |
| Conflicting Flow All     | -      | 0    | 0     | -      | -    | 0     | -      | -     | 412   | -      | -    | 524   |
| Stage 1                  | -      | -    | -     | -      | -    | -     | -      | -     | -     | -      | -    | -     |
| Stage 2                  | -      | -    | -     | -      | -    | -     | -      | -     | -     | -      | -    | -     |
| Critical Hdwy            | -      | -    | -     | -      | -    | -     | -      | -     | 6.92  | -      | -    | 6.9   |
| Critical Hdwy Stg 1      | -      | -    | -     | -      | -    | -     | -      | -     | -     | -      | -    | -     |
| Critical Hdwy Stg 2      | -      | -    | -     | -      | -    | -     | -      | -     | -     | -      | -    | -     |
| Follow-up Hdwy           | -      | -    | -     | -      | -    | -     | -      | -     | 3.31  | -      | -    | 3.3   |
| Pot Cap-1 Maneuver       | 0      | -    | -     | 0      | -    | -     | 0      | 0     | 592   | 0      | 0    | 503   |
| Stage 1                  | 0      | -    | -     | 0      | -    | -     | 0      | 0     | -     | 0      | 0    | -     |
| Stage 2                  | 0      | -    | -     | 0      | -    | -     | 0      | 0     | -     | 0      | 0    | -     |
| Platoon blocked, %       | -      | -    | -     | -      | -    | -     | -      | -     | -     | -      | -    | -     |
| Mov Cap-1 Maneuver       | -      | -    | -     | -      | -    | -     | -      | -     | 590   | -      | -    | 503   |
| Mov Cap-2 Maneuver       | -      | -    | -     | -      | -    | -     | -      | -     | -     | -      | -    | -     |
| Stage 1                  | -      | -    | -     | -      | -    | -     | -      | -     | -     | -      | -    | -     |
| Stage 2                  | -      | -    | -     | -      | -    | -     | -      | -     | -     | -      | -    | -     |
| Approach                 | EB     |      |       | WB     |      |       | NB     |       |       | SB     |      |       |
| HCM Control Delay, s     | 0      |      |       | 0      |      |       | 15.8   |       |       | 13.8   |      |       |
| HCM LOS                  |        |      |       |        |      |       | C      |       |       | B      |      |       |
| Minor Lane/Major Mvmt    | NBLn1  |      |       | EBT    | EBR  | WBT   | WBR    | SBLn1 |       |        |      |       |
| Capacity (veh/h)         | 590    |      |       | -      | -    | -     | -      | 503   |       |        |      |       |
| HCM Lane V/C Ratio       | 0.442  |      |       | -      | -    | -     | -      | 0.184 |       |        |      |       |
| HCM Control Delay (s)    | 15.8   |      |       | -      | -    | -     | -      | 13.8  |       |        |      |       |
| HCM Lane LOS             | C      |      |       | -      | -    | -     | -      | B     |       |        |      |       |
| HCM 95th %ile Q(veh)     | 2.3    |      |       | -      | -    | -     | -      | 0.7   |       |        |      |       |

12239.00 :: Needham Street  
27: I-95 SB Ramps & Highland Avenue

2025 Build Conditions with Shuttle Service  
Timing Plan: Saturday MIDDAY

| Intersection             |        |      |       |        |      |       |        |       |       |        |      |       |
|--------------------------|--------|------|-------|--------|------|-------|--------|-------|-------|--------|------|-------|
| Int Delay, s/veh         |        |      |       |        |      |       |        |       |       |        |      |       |
| 8.2                      |        |      |       |        |      |       |        |       |       |        |      |       |
| Movement                 | EBL    | EBT  | EBR   | WBL    | WBT  | WBR   | NBL    | NBT   | NBR   | SBL    | SBT  | SBR   |
| Lane Configurations      |        | ↕↕   |       |        | ↕↕   | ↕     |        |       | ↕     |        |      | ↕     |
| Traffic Vol, veh/h       | 0      | 760  | 155   | 0      | 750  | 300   | 0      | 0     | 385   | 0      | 0    | 435   |
| Future Vol, veh/h        | 0      | 760  | 155   | 0      | 750  | 300   | 0      | 0     | 385   | 0      | 0    | 435   |
| Conflicting Peds, #/hr   | 0      | 0    | 2     | 0      | 0    | 0     | 0      | 0     | 2     | 0      | 0    | 0     |
| Sign Control             | Free   | Free | Free  | Free   | Free | Free  | Stop   | Stop  | Stop  | Stop   | Stop | Stop  |
| RT Channelized           | -      | -    | Yield | -      | -    | Yield | -      | -     | Yield | -      | -    | Yield |
| Storage Length           | -      | -    | -     | -      | -    | 0     | -      | -     | 0     | -      | -    | 0     |
| Veh in Median Storage, # | -      | 0    | -     | -      | 0    | -     | -      | 0     | -     | -      | 0    | -     |
| Grade, %                 | -      | 0    | -     | -      | 0    | -     | -      | 0     | -     | -      | 0    | -     |
| Peak Hour Factor         | 92     | 92   | 92    | 92     | 92   | 92    | 92     | 92    | 92    | 92     | 92   | 92    |
| Heavy Vehicles, %        | 0      | 0    | 0     | 1      | 1    | 1     | 1      | 1     | 1     | 0      | 0    | 0     |
| Mvmt Flow                | 0      | 826  | 168   | 0      | 815  | 326   | 0      | 0     | 418   | 0      | 0    | 473   |
| Major/Minor              | Major1 |      |       | Major2 |      |       | Minor1 |       |       | Minor2 |      |       |
| Conflicting Flow All     | -      | 0    | 0     | -      | -    | 0     | -      | -     | 417   | -      | -    | 408   |
| Stage 1                  | -      | -    | -     | -      | -    | -     | -      | -     | -     | -      | -    | -     |
| Stage 2                  | -      | -    | -     | -      | -    | -     | -      | -     | -     | -      | -    | -     |
| Critical Hdwy            | -      | -    | -     | -      | -    | -     | -      | -     | 6.92  | -      | -    | 6.9   |
| Critical Hdwy Stg 1      | -      | -    | -     | -      | -    | -     | -      | -     | -     | -      | -    | -     |
| Critical Hdwy Stg 2      | -      | -    | -     | -      | -    | -     | -      | -     | -     | -      | -    | -     |
| Follow-up Hdwy           | -      | -    | -     | -      | -    | -     | -      | -     | 3.31  | -      | -    | 3.3   |
| Pot Cap-1 Maneuver       | 0      | -    | -     | 0      | -    | -     | 0      | 0     | 587   | 0      | 0    | 598   |
| Stage 1                  | 0      | -    | -     | 0      | -    | -     | 0      | 0     | -     | 0      | 0    | -     |
| Stage 2                  | 0      | -    | -     | 0      | -    | -     | 0      | 0     | -     | 0      | 0    | -     |
| Platoon blocked, %       | -      | -    | -     | -      | -    | -     | -      | -     | -     | -      | -    | -     |
| Mov Cap-1 Maneuver       | -      | -    | -     | -      | -    | -     | -      | -     | 585   | -      | -    | 598   |
| Mov Cap-2 Maneuver       | -      | -    | -     | -      | -    | -     | -      | -     | -     | -      | -    | -     |
| Stage 1                  | -      | -    | -     | -      | -    | -     | -      | -     | -     | -      | -    | -     |
| Stage 2                  | -      | -    | -     | -      | -    | -     | -      | -     | -     | -      | -    | -     |
| Approach                 | EB     |      |       | WB     |      |       | NB     |       |       | SB     |      |       |
| HCM Control Delay, s     | 0      |      |       | 0      |      |       | 25.1   |       |       | 30     |      |       |
| HCM LOS                  |        |      |       |        |      |       | D      |       |       | D      |      |       |
| Minor Lane/Major Mvmt    | NBLn1  |      |       | EBT    | EBR  | WBT   | WBR    | SBLn1 |       |        |      |       |
| Capacity (veh/h)         | 585    |      |       | -      | -    | -     | -      | 598   |       |        |      |       |
| HCM Lane V/C Ratio       | 0.715  |      |       | -      | -    | -     | -      | 0.791 |       |        |      |       |
| HCM Control Delay (s)    | 25.1   |      |       | -      | -    | -     | -      | 30    |       |        |      |       |
| HCM Lane LOS             | D      |      |       | -      | -    | -     | -      | D     |       |        |      |       |
| HCM 95th %ile Q(veh)     | 5.9    |      |       | -      | -    | -     | -      | 7.6   |       |        |      |       |





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## Intersection Capacity Analyses – With Existing Mode Share



12239.00 :: Needham Street  
1: Chestnut Street & Route 9 WB Access Road

2018 Existing Conditions  
Timing Plan: Weekday Morning

| Intersection               |      |      |      |      |      |      |      |      |      |      |      |      |
|----------------------------|------|------|------|------|------|------|------|------|------|------|------|------|
| Intersection Delay, s/veh  | 51.7 |      |      |      |      |      |      |      |      |      |      |      |
| Intersection LOS           | F    |      |      |      |      |      |      |      |      |      |      |      |
| Movement                   | EBL  | EBT  | EBR  | WBL  | WBT  | WBR  | NBL  | NBT  | NBR  | SBL  | SBT  | SBR  |
| Lane Configurations        |      | ↔    |      |      | ↔    |      |      | ↔    |      | ↔    |      |      |
| Traffic Vol, veh/h         | 30   | 1    | 10   | 45   | 100  | 35   | 60   | 575  | 1    | 0    | 310  | 255  |
| Future Vol, veh/h          | 30   | 1    | 10   | 45   | 100  | 35   | 60   | 575  | 1    | 0    | 310  | 255  |
| Peak Hour Factor           | 0.88 | 0.88 | 0.88 | 0.90 | 0.90 | 0.90 | 0.97 | 0.97 | 0.97 | 0.98 | 0.98 | 0.98 |
| Heavy Vehicles, %          | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    |
| Mvmt Flow                  | 34   | 1    | 11   | 50   | 111  | 39   | 62   | 593  | 1    | 0    | 316  | 260  |
| Number of Lanes            | 0    | 1    | 0    | 0    | 1    | 0    | 0    | 1    | 0    | 0    | 1    | 0    |
| Approach                   | EB   |      |      | WB   |      |      | NB   |      |      | SB   |      |      |
| Opposing Approach          | WB   |      |      | EB   |      |      | SB   |      |      | NB   |      |      |
| Opposing Lanes             | 1    |      |      | 1    |      |      | 1    |      |      | 1    |      |      |
| Conflicting Approach Left  | SB   |      |      | NB   |      |      | EB   |      |      | WB   |      |      |
| Conflicting Lanes Left     | 1    |      |      | 1    |      |      | 1    |      |      | 1    |      |      |
| Conflicting Approach Right | NB   |      |      | SB   |      |      | WB   |      |      | EB   |      |      |
| Conflicting Lanes Right    | 1    |      |      | 1    |      |      | 1    |      |      | 1    |      |      |
| HCM Control Delay          | 12   |      |      | 14.9 |      |      | 77.4 |      |      | 38.4 |      |      |
| HCM LOS                    | B    |      |      | B    |      |      | F    |      |      | E    |      |      |

| Lane                   | NBLn1 | EBLn1 | WBLn1 | SBLn1 |
|------------------------|-------|-------|-------|-------|
| Vol Left, %            | 9%    | 73%   | 25%   | 0%    |
| Vol Thru, %            | 90%   | 2%    | 56%   | 55%   |
| Vol Right, %           | 0%    | 24%   | 19%   | 45%   |
| Sign Control           | Stop  | Stop  | Stop  | Stop  |
| Traffic Vol by Lane    | 636   | 41    | 180   | 565   |
| LT Vol                 | 60    | 30    | 45    | 0     |
| Through Vol            | 575   | 1     | 100   | 310   |
| RT Vol                 | 1     | 10    | 35    | 255   |
| Lane Flow Rate         | 656   | 47    | 200   | 577   |
| Geometry Grp           | 1     | 1     | 1     | 1     |
| Degree of Util (X)     | 1.062 | 0.101 | 0.394 | 0.894 |
| Departure Headway (Hd) | 5.833 | 8.101 | 7.272 | 5.721 |
| Convergence, Y/N       | Yes   | Yes   | Yes   | Yes   |
| Cap                    | 629   | 445   | 498   | 640   |
| Service Time           | 3.833 | 6.101 | 5.272 | 3.721 |
| HCM Lane V/C Ratio     | 1.043 | 0.106 | 0.402 | 0.902 |
| HCM Control Delay      | 77.4  | 12    | 14.9  | 38.4  |
| HCM Lane LOS           | F     | B     | B     | E     |
| HCM 95th-tile Q        | 18.3  | 0.3   | 1.9   | 10.9  |

12239.00 :: Needham Street  
2: Chestnut Street & Route 9 EB Access Road

2018 Existing Conditions  
Timing Plan: Weekday Morning

| Intersection               |      |      |      |      |      |      |      |      |      |      |      |      |
|----------------------------|------|------|------|------|------|------|------|------|------|------|------|------|
| Intersection Delay, s/veh  | 18.2 |      |      |      |      |      |      |      |      |      |      |      |
| Intersection LOS           | C    |      |      |      |      |      |      |      |      |      |      |      |
| Movement                   | EBL  | EBT  | EBR  | WBL  | WBT  | WBR  | NBL  | NBT  | NBR  | SBL  | SBT  | SBR  |
| Lane Configurations        |      | ↔    |      |      | ↔    |      |      | ↔    |      | ↔    |      |      |
| Traffic Vol, veh/h         | 245  | 50   | 10   | 0    | 5    | 40   | 2    | 350  | 50   | 70   | 295  | 2    |
| Future Vol, veh/h          | 245  | 50   | 10   | 0    | 5    | 40   | 2    | 350  | 50   | 70   | 295  | 2    |
| Peak Hour Factor           | 0.95 | 0.95 | 0.95 | 0.81 | 0.81 | 0.81 | 0.97 | 0.97 | 0.97 | 0.99 | 0.99 | 0.99 |
| Heavy Vehicles, %          | 0    | 0    | 0    | 0    | 0    | 0    | 1    | 1    | 1    | 0    | 0    | 0    |
| Mvmt Flow                  | 258  | 53   | 11   | 0    | 6    | 49   | 2    | 361  | 52   | 71   | 298  | 2    |
| Number of Lanes            | 0    | 1    | 0    | 0    | 1    | 0    | 0    | 1    | 0    | 0    | 1    | 0    |
| Approach                   | EB   |      |      | WB   |      |      | NB   |      |      | SB   |      |      |
| Opposing Approach          | WB   |      |      | EB   |      |      | SB   |      |      | NB   |      |      |
| Opposing Lanes             | 1    |      |      | 1    |      |      | 1    |      |      | 1    |      |      |
| Conflicting Approach Left  | SB   |      |      | NB   |      |      | EB   |      |      | WB   |      |      |
| Conflicting Lanes Left     | 1    |      |      | 1    |      |      | 1    |      |      | 1    |      |      |
| Conflicting Approach Right | NB   |      |      | SB   |      |      | WB   |      |      | EB   |      |      |
| Conflicting Lanes Right    | 1    |      |      | 1    |      |      | 1    |      |      | 1    |      |      |
| HCM Control Delay          | 17.5 |      |      | 10.3 |      |      | 19.9 |      |      | 18.1 |      |      |
| HCM LOS                    | C    |      |      | B    |      |      | C    |      |      | C    |      |      |

| Lane                   | NBLn1 | EBLn1 | WBLn1 | SBLn1 |
|------------------------|-------|-------|-------|-------|
| Vol Left, %            | 0%    | 80%   | 0%    | 19%   |
| Vol Thru, %            | 87%   | 16%   | 11%   | 80%   |
| Vol Right, %           | 12%   | 3%    | 89%   | 1%    |
| Sign Control           | Stop  | Stop  | Stop  | Stop  |
| Traffic Vol by Lane    | 402   | 305   | 45    | 367   |
| LT Vol                 | 2     | 245   | 0     | 70    |
| Through Vol            | 350   | 50    | 5     | 295   |
| RT Vol                 | 50    | 10    | 40    | 2     |
| Lane Flow Rate         | 414   | 321   | 56    | 371   |
| Geometry Grp           | 1     | 1     | 1     | 1     |
| Degree of Util (X)     | 0.67  | 0.564 | 0.101 | 0.615 |
| Departure Headway (Hd) | 5.819 | 6.459 | 6.547 | 5.975 |
| Convergence, Y/N       | Yes   | Yes   | Yes   | Yes   |
| Cap                    | 622   | 562   | 547   | 608   |
| Service Time           | 3.831 | 4.459 | 4.593 | 3.989 |
| HCM Lane V/C Ratio     | 0.666 | 0.571 | 0.102 | 0.61  |
| HCM Control Delay      | 19.9  | 17.5  | 10.3  | 18.1  |
| HCM Lane LOS           | C     | C     | B     | C     |
| HCM 95th-tile Q        | 5.1   | 3.5   | 0.3   | 4.2   |

12239.00 :: Needham Street  
3: Chestnut Street & Elliot Street

2018 Existing Conditions  
Timing Plan: Weekday Morning

| Lane Group              | EBL   | EBT   | EBR  | WBL   | WBT   | WBR  | NBL   | NBT   | NBR  | SBL   | SBT   | SBR  | Ø3   |
|-------------------------|-------|-------|------|-------|-------|------|-------|-------|------|-------|-------|------|------|
| Lane Configurations     |       | ↔     |      |       | ↔     |      |       | ↔     |      |       | ↔     |      |      |
| Traffic Volume (vph)    | 355   | 260   | 40   | 5     | 55    | 35   | 40    | 160   | 5    | 30    | 220   | 165  |      |
| Future Volume (vph)     | 355   | 260   | 40   | 5     | 55    | 35   | 40    | 160   | 5    | 30    | 220   | 165  |      |
| Ideal Flow (vphpl)      | 1900  | 1900  | 1900 | 1900  | 1900  | 1900 | 1900  | 1900  | 1900 | 1900  | 1900  | 1900 |      |
| Satd. Flow (prot)       | 0     | 1833  | 0    | 0     | 1800  | 0    | 0     | 1838  | 0    | 0     | 1775  | 0    |      |
| Fit Permitted           |       | 0.772 |      |       | 0.969 |      |       | 0.794 |      |       | 0.963 |      |      |
| Satd. Flow (perm)       | 0     | 1453  | 0    | 0     | 1749  | 0    | 0     | 1474  | 0    | 0     | 1716  | 0    |      |
| Right Turn on Red       |       | Yes   |      |       | Yes   |      |       | Yes   |      |       | Yes   |      |      |
| Satd. Flow (RTOR)       |       | 4     |      |       | 35    |      |       | 1     |      |       | 40    |      |      |
| Link Speed (mph)        |       | 30    |      |       | 30    |      |       | 30    |      |       | 30    |      |      |
| Link Distance (ft)      |       | 764   |      |       | 972   |      |       | 2055  |      |       | 1553  |      |      |
| Travel Time (s)         |       | 17.4  |      |       | 22.1  |      |       | 46.7  |      |       | 35.3  |      |      |
| Confl. Peds. (#/hr)     |       |       | 1    | 1     |       |      | 1     |       | 1    | 1     |       | 1    |      |
| Peak Hour Factor        | 0.96  | 0.96  | 0.96 | 0.87  | 0.87  | 0.87 | 0.92  | 0.92  | 0.97 | 0.97  | 0.97  | 0.97 |      |
| Heavy Vehicles (%)      | 0%    | 0%    | 0%   | 0%    | 0%    | 0%   | 2%    | 2%    | 2%   | 0%    | 0%    | 0%   |      |
| Shared Lane Traffic (%) |       |       |      |       |       |      |       |       |      |       |       |      |      |
| Lane Group Flow (vph)   | 0     | 683   | 0    | 0     | 109   | 0    | 0     | 222   | 0    | 0     | 428   | 0    |      |
| Turn Type               | Perm  | NA    |      | Perm  | NA    |      | Perm  | NA    |      | Perm  | NA    |      |      |
| Protected Phases        |       | 1     |      |       | 1     |      |       | 2     |      |       | 2     |      | 3    |
| Permitted Phases        | 1     |       |      | 1     |       |      | 2     |       |      | 2     |       |      |      |
| Detector Phase          | 1     | 1     |      | 1     | 1     |      | 2     | 2     |      | 2     | 2     |      |      |
| Switch Phase            |       |       |      |       |       |      |       |       |      |       |       |      |      |
| Minimum Initial (s)     | 6.0   | 6.0   |      | 6.0   | 6.0   |      | 6.0   | 6.0   |      | 6.0   | 6.0   |      | 4.0  |
| Minimum Split (s)       | 11.0  | 11.0  |      | 11.0  | 11.0  |      | 11.0  | 11.0  |      | 11.0  | 11.0  |      | 19.0 |
| Total Split (s)         | 35.0  | 35.0  |      | 35.0  | 35.0  |      | 35.0  | 35.0  |      | 35.0  | 35.0  |      | 19.0 |
| Total Split (%)         | 39.3% | 39.3% |      | 39.3% | 39.3% |      | 39.3% | 39.3% |      | 39.3% | 39.3% |      | 21%  |
| Yellow Time (s)         | 3.0   | 3.0   |      | 3.0   | 3.0   |      | 3.0   | 3.0   |      | 3.0   | 3.0   |      | 3.0  |
| All-Red Time (s)        | 2.0   | 2.0   |      | 2.0   | 2.0   |      | 2.0   | 2.0   |      | 2.0   | 2.0   |      | 1.0  |
| Lost Time Adjust (s)    |       | 0.0   |      |       | 0.0   |      |       | 0.0   |      |       | 0.0   |      |      |
| Total Lost Time (s)     |       | 5.0   |      |       | 5.0   |      |       | 5.0   |      |       | 5.0   |      |      |
| Lead/Lag                | Lead  | Lead  |      | Lead  | Lead  |      | Lag   | Lag   |      | Lag   | Lag   |      |      |
| Lead-Lag Optimize?      |       |       |      |       |       |      |       |       |      |       |       |      |      |
| Recall Mode             | None  | None  |      | None  | None  |      | None  | None  |      | None  | None  |      | None |
| Act Effct Green (s)     |       | 31.1  |      |       | 31.1  |      |       | 18.5  |      |       | 18.5  |      |      |
| Actuated g/C Ratio      |       | 0.50  |      |       | 0.50  |      |       | 0.30  |      |       | 0.30  |      |      |
| v/c Ratio               |       | 0.94  |      |       | 0.12  |      |       | 0.51  |      |       | 0.80  |      |      |
| Control Delay           |       | 43.4  |      |       | 10.1  |      |       | 23.3  |      |       | 31.3  |      |      |
| Queue Delay             |       | 0.0   |      |       | 0.0   |      |       | 0.0   |      |       | 0.0   |      |      |
| Total Delay             |       | 43.4  |      |       | 10.1  |      |       | 23.3  |      |       | 31.3  |      |      |
| LOS                     |       | D     |      |       | B     |      |       | C     |      |       | C     |      |      |
| Approach Delay          |       | 43.4  |      |       | 10.1  |      |       | 23.3  |      |       | 31.3  |      |      |
| Approach LOS            |       | D     |      |       | B     |      |       | C     |      |       | C     |      |      |
| Queue Length 50th (ft)  |       | 197   |      |       | 12    |      |       | 61    |      |       | 120   |      |      |
| Queue Length 95th (ft)  |       | #734  |      |       | 63    |      |       | 162   |      |       | 298   |      |      |
| Internal Link Dist (ft) |       | 684   |      |       | 892   |      |       | 1975  |      |       | 1473  |      |      |
| Turn Bay Length (ft)    |       |       |      |       |       |      |       |       |      |       |       |      |      |
| Base Capacity (vph)     |       | 723   |      |       | 886   |      |       | 732   |      |       | 872   |      |      |
| Starvation Cap Reductn  |       | 0     |      |       | 0     |      |       | 0     |      |       | 0     |      |      |
| Spillback Cap Reductn   |       | 0     |      |       | 0     |      |       | 0     |      |       | 0     |      |      |
| Storage Cap Reductn     |       | 0     |      |       | 0     |      |       | 0     |      |       | 0     |      |      |
| Reduced v/c Ratio       |       | 0.94  |      |       | 0.12  |      |       | 0.30  |      |       | 0.49  |      |      |

Intersection Summary

|                                                                 |                        |
|-----------------------------------------------------------------|------------------------|
| Area Type:                                                      | Other                  |
| Cycle Length: 89                                                |                        |
| Actuated Cycle Length: 62.7                                     |                        |
| Natural Cycle: 90                                               |                        |
| Control Type: Actuated-Uncoordinated                            |                        |
| Maximum v/c Ratio: 0.94                                         |                        |
| Intersection Signal Delay: 34.2                                 | Intersection LOS: C    |
| Intersection Capacity Utilization 76.5%                         | ICU Level of Service D |
| Analysis Period (min) 15                                        |                        |
| # 95th percentile volume exceeds capacity, queue may be longer. |                        |
| Queue shown is maximum after two cycles.                        |                        |

Splits and Phases: 3: Chestnut Street & Elliot Street



12239.00 :: Needham Street  
4: Oak Street & Chestnut Street

2018 Existing Conditions  
Timing Plan: Weekday Morning

| Lane Group              | EBL   | EBT   | EBR  | WBL   | WBT   | WBR  | NBL   | NBT   | NBR  | SBL   | SBT   | SBR  | Ø3   |
|-------------------------|-------|-------|------|-------|-------|------|-------|-------|------|-------|-------|------|------|
| Lane Configurations     |       | ↔     |      |       | ↔     |      |       | ↔     |      |       | ↔     |      |      |
| Traffic Volume (vph)    | 15    | 25    | 290  | 35    | 15    | 5    | 250   | 125   | 40   | 2     | 45    | 5    |      |
| Future Volume (vph)     | 15    | 25    | 290  | 35    | 15    | 5    | 250   | 125   | 40   | 2     | 45    | 5    |      |
| Ideal Flow (vphpl)      | 1900  | 1900  | 1900 | 1900  | 1900  | 1900 | 1900  | 1900  | 1900 | 1900  | 1900  | 1900 |      |
| Satd. Flow (prot)       | 0     | 1671  | 0    | 0     | 1815  | 0    | 0     | 1798  | 0    | 0     | 1830  | 0    |      |
| Fit Permitted           |       | 0.984 |      |       | 0.375 |      |       | 0.778 |      |       | 0.989 |      |      |
| Satd. Flow (perm)       | 0     | 1647  | 0    | 0     | 703   | 0    | 0     | 1433  | 0    | 0     | 1813  | 0    |      |
| Right Turn on Red       |       | Yes   |      |       | Yes   |      |       | Yes   |      |       | Yes   |      |      |
| Satd. Flow (RTOR)       |       | 309   |      |       | 5     |      |       | 6     |      |       | 6     |      |      |
| Link Speed (mph)        |       | 30    |      |       | 30    |      |       | 30    |      |       | 30    |      |      |
| Link Distance (ft)      |       | 2055  |      |       | 492   |      |       | 226   |      |       | 762   |      |      |
| Travel Time (s)         |       | 46.7  |      |       | 11.2  |      |       | 5.1   |      |       | 17.3  |      |      |
| Confl. Peds. (#/hr)     |       | 1     |      |       |       |      | 1     | 6     |      | 6     | 6     |      | 6    |
| Confl. Bikes (#/hr)     |       |       |      |       |       |      |       |       |      |       |       |      | 1    |
| Peak Hour Factor        | 0.94  | 0.94  | 0.94 | 0.83  | 0.83  | 0.90 | 0.90  | 0.90  | 0.81 | 0.81  | 0.81  |      | 0.81 |
| Heavy Vehicles (%)      | 0%    | 0%    | 0%   | 0%    | 0%    | 1%   | 1%    | 1%    | 2%   | 2%    | 2%    |      | 2%   |
| Shared Lane Traffic (%) |       |       |      |       |       |      |       |       |      |       |       |      |      |
| Lane Group Flow (vph)   | 0     | 352   | 0    | 0     | 66    | 0    | 0     | 461   | 0    | 0     | 64    | 0    |      |
| Turn Type               | Perm  | NA    |      | Perm  | NA    |      | Perm  | NA    |      | Perm  | NA    |      |      |
| Protected Phases        |       | 1     |      |       | 1     |      |       | 2     |      |       | 2     |      | 3    |
| Permitted Phases        | 1     |       |      | 1     |       |      | 2     |       |      | 2     |       |      |      |
| Detector Phase          | 1     | 1     |      | 1     | 1     |      | 2     | 2     |      | 2     | 2     |      |      |
| Switch Phase            |       |       |      |       |       |      |       |       |      |       |       |      |      |
| Minimum Initial (s)     | 8.0   | 8.0   |      | 8.0   | 8.0   |      | 8.0   | 8.0   |      | 8.0   | 8.0   |      | 8.0  |
| Minimum Split (s)       | 13.0  | 13.0  |      | 13.0  | 13.0  |      | 14.0  | 14.0  |      | 14.0  | 14.0  |      | 18.0 |
| Total Split (s)         | 35.0  | 35.0  |      | 35.0  | 35.0  |      | 36.0  | 36.0  |      | 36.0  | 36.0  |      | 25.0 |
| Total Split (%)         | 36.5% | 36.5% |      | 36.5% | 36.5% |      | 37.5% | 37.5% |      | 37.5% | 37.5% |      | 26%  |
| Yellow Time (s)         | 4.0   | 4.0   |      | 4.0   | 4.0   |      | 4.0   | 4.0   |      | 4.0   | 4.0   |      | 4.0  |
| All-Red Time (s)        | 1.0   | 1.0   |      | 1.0   | 1.0   |      | 2.0   | 2.0   |      | 2.0   | 2.0   |      | 1.0  |
| Lost Time Adjust (s)    |       | 0.0   |      |       | 0.0   |      |       | 0.0   |      |       | 0.0   |      |      |
| Total Lost Time (s)     |       | 5.0   |      |       | 5.0   |      |       | 6.0   |      |       | 6.0   |      |      |
| Lead/Lag                | Lead  | Lead  |      | Lead  | Lead  |      | Lag   | Lag   |      | Lag   | Lag   |      |      |
| Lead-Lag Optimize?      |       |       |      |       |       |      |       |       |      |       |       |      |      |
| Recall Mode             | Min   | Min   |      | Min   | Min   |      | Min   | Min   |      | Min   | Min   |      | None |
| Act Effct Green (s)     |       | 10.8  |      |       | 10.8  |      |       | 29.6  |      |       | 29.6  |      |      |
| Actuated g/C Ratio      |       | 0.20  |      |       | 0.20  |      |       | 0.55  |      |       | 0.55  |      |      |
| v/c Ratio               |       | 0.61  |      |       | 0.46  |      |       | 0.59  |      |       | 0.06  |      |      |
| Control Delay           |       | 9.7   |      |       | 30.6  |      |       | 16.0  |      |       | 8.8   |      |      |
| Queue Delay             |       | 0.0   |      |       | 0.0   |      |       | 0.0   |      |       | 0.0   |      |      |
| Total Delay             |       | 9.7   |      |       | 30.6  |      |       | 16.0  |      |       | 8.8   |      |      |
| LOS                     |       | A     |      |       | C     |      |       | B     |      |       | A     |      |      |
| Approach Delay          |       | 9.7   |      |       | 30.6  |      |       | 16.0  |      |       | 8.8   |      |      |
| Approach LOS            |       | A     |      |       | C     |      |       | B     |      |       | A     |      |      |
| Queue Length 50th (ft)  |       | 10    |      |       | 15    |      |       | 68    |      |       | 6     |      |      |
| Queue Length 95th (ft)  |       | 96    |      |       | 56    |      |       | #361  |      |       | 37    |      |      |
| Internal Link Dist (ft) |       | 1975  |      |       | 412   |      |       | 146   |      |       | 682   |      |      |
| Turn Bay Length (ft)    |       |       |      |       |       |      |       |       |      |       |       |      |      |
| Base Capacity (vph)     |       | 1074  |      |       | 404   |      |       | 822   |      |       | 1040  |      |      |
| Starvation Cap Reductn  |       | 0     |      |       | 0     |      |       | 0     |      |       | 0     |      |      |
| Spillback Cap Reductn   |       | 0     |      |       | 0     |      |       | 0     |      |       | 0     |      |      |
| Storage Cap Reductn     |       | 0     |      |       | 0     |      |       | 0     |      |       | 0     |      |      |
| Reduced v/c Ratio       |       | 0.33  |      |       | 0.16  |      |       | 0.56  |      |       | 0.06  |      |      |

Intersection Summary

|                                                                 |                        |
|-----------------------------------------------------------------|------------------------|
| Area Type:                                                      | Other                  |
| Cycle Length: 96                                                |                        |
| Actuated Cycle Length: 54.3                                     |                        |
| Natural Cycle: 60                                               |                        |
| Control Type: Actuated-Uncoordinated                            |                        |
| Maximum v/c Ratio: 0.61                                         |                        |
| Intersection Signal Delay: 14.1                                 | Intersection LOS: B    |
| Intersection Capacity Utilization 58.6%                         | ICU Level of Service B |
| Analysis Period (min) 15                                        |                        |
| # 95th percentile volume exceeds capacity, queue may be longer. |                        |
| Queue shown is maximum after two cycles.                        |                        |

Splits and Phases: 4: Oak Street & Chestnut Street



12239.00 :: Needham Street  
5: Oak Street & Site Driveway

2018 Existing Conditions  
Timing Plan: Weekday Morning

| Intersection             |      |      |      |      |      |      |
|--------------------------|------|------|------|------|------|------|
| Int Delay, s/veh         | 0.1  |      |      |      |      |      |
| Movement                 | WBL  | WBR  | NBT  | NBR  | SBL  | SBT  |
| Lane Configurations      | W    |      |      |      |      | W    |
| Traffic Vol, veh/h       | 2    | 1    | 415  | 1    | 1    | 370  |
| Future Vol, veh/h        | 2    | 1    | 415  | 1    | 1    | 370  |
| Conflicting Peds, #/hr   | 4    | 0    | 0    | 3    | 3    | 0    |
| Sign Control             | Stop | Stop | Free | Free | Free | Free |
| RT Channelized           | -    | None | -    | None | -    | None |
| Storage Length           | 0    | -    | -    | -    | -    | -    |
| Veh in Median Storage, # | 0    | -    | 0    | -    | -    | 0    |
| Grade, %                 | 0    | -    | 0    | -    | -    | 0    |
| Peak Hour Factor         | 38   | 38   | 91   | 91   | 90   | 90   |
| Heavy Vehicles, %        | 0    | 0    | 1    | 1    | 1    | 1    |
| Mvmt Flow                | 5    | 3    | 456  | 1    | 1    | 411  |

| Major/Minor          | Minor1 | Major1 | Major2 |
|----------------------|--------|--------|--------|
| Conflicting Flow All | 877    | 460    | 0      |
| Stage 1              | 460    | -      | -      |
| Stage 2              | 417    | -      | -      |
| Critical Hdwy        | 6.4    | 6.2    | -      |
| Critical Hdwy Stp 1  | 5.4    | -      | -      |
| Critical Hdwy Stp 2  | 5.4    | -      | -      |
| Follow-up Hdwy       | 3.5    | 3.3    | -      |
| Pot Cap-1 Maneuver   | 322    | 605    | -      |
| Stage 1              | 640    | -      | -      |
| Stage 2              | 669    | -      | -      |
| Platoon blocked, %   | -      | -      | -      |
| Mov Cap-1 Maneuver   | 320    | 603    | -      |
| Mov Cap-2 Maneuver   | 320    | -      | -      |
| Stage 1              | 638    | -      | -      |
| Stage 2              | 666    | -      | -      |

| Approach             | WB   | NB | SB |
|----------------------|------|----|----|
| HCM Control Delay, s | 14.7 | 0  | 0  |
| HCM LOS              | B    |    |    |

| Minor Lane/Major Mvmt | NBT | NBR | WBLn1 | SBL   | SBT |
|-----------------------|-----|-----|-------|-------|-----|
| Capacity (veh/h)      | -   | -   | 379   | 1106  | -   |
| HCM Lane V/C Ratio    | -   | -   | 0.021 | 0.001 | -   |
| HCM Control Delay (s) | -   | -   | 14.7  | 8.3   | 0   |
| HCM Lane LOS          | -   | -   | B     | A     | A   |
| HCM 95th %ile Q(veh)  | -   | -   | 0.1   | 0     | -   |

12239.00 :: Needham Street  
6: Needham Street & Oak Street/Christina Street

2018 Existing Conditions  
Timing Plan: Weekday Morning

| Lane Group              | EBL   | EBT   | EBR   | WBL   | WBT   | WBR   | NBL   | NBT   | NBR   | SBL   | SBT   | SBR   |
|-------------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| Lane Configurations     |       | W     | W     |       | W     | W     |       | W     | W     |       | W     | W     |
| Traffic Volume (vph)    | 120   | 115   | 135   | 125   | 190   | 20    | 120   | 625   | 70    | 30    | 575   | 95    |
| Future Volume (vph)     | 120   | 115   | 135   | 125   | 190   | 20    | 120   | 625   | 70    | 30    | 575   | 95    |
| Ideal Flow (vph/pl)     | 1900  | 1900  | 1900  | 1900  | 1900  | 1900  | 1900  | 1900  | 1900  | 1900  | 1900  | 1900  |
| Storage Length (ft)     | 0     | 100   | 200   | 200   | 100   | 0     | 1     | 0     | 220   | 1     | 0     | 0     |
| Storage Lanes           | 0     | 1     | 0     | 0     | 1     | 0     | 0     | 1     | 0     | 1     | 0     | 0     |
| Taper Length (ft)       | 25    |       | 25    |       | 25    |       | 25    |       | 25    |       | 25    |       |
| Satd. Flow (prot)       | 0     | 1834  | 1599  | 0     | 1848  | 0     | 1787  | 1849  | 0     | 1770  | 1818  | 0     |
| Flt Permitted           | 0.634 |       |       | 0.705 |       | 0.222 |       | 0.177 |       |       |       |       |
| Satd. Flow (perm)       | 0     | 1190  | 1599  | 0     | 1326  | 0     | 417   | 1849  | 0     | 330   | 1818  | 0     |
| Right Turn on Red       |       | Yes   |       |       | Yes   |       |       | No    |       |       | No    |       |
| Satd. Flow (RTOR)       |       | 145   |       |       | 4     |       |       |       |       |       |       |       |
| Link Speed (mph)        | 30    |       | 30    |       | 30    |       | 30    |       | 30    |       | 30    |       |
| Link Distance (ft)      | 1238  |       | 516   |       | 754   |       | 754   |       | 275   |       | 275   |       |
| Travel Time (s)         | 28.1  |       | 11.7  |       | 17.1  |       | 17.1  |       | 6.3   |       | 6.3   |       |
| Confl. Peds. (#/hr)     | 6     |       |       |       | 6     | 2     |       | 2     | 2     |       | 2     | 2     |
| Peak Hour Factor        | 0.93  | 0.93  | 0.93  | 0.89  | 0.89  | 0.89  | 0.93  | 0.93  | 0.93  | 0.97  | 0.97  | 0.97  |
| Heavy Vehicles (%)      | 1%    | 1%    | 1%    | 0%    | 0%    | 0%    | 1%    | 1%    | 1%    | 2%    | 2%    | 2%    |
| Shared Lane Traffic (%) |       |       |       |       |       |       |       |       |       |       |       |       |
| Lane Group Flow (vph)   | 0     | 253   | 145   | 0     | 375   | 0     | 129   | 747   | 0     | 31    | 691   | 0     |
| Turn Type               | Perm  | NA    | Perm  | Perm  | NA    | Perm  | NA    | Perm  | NA    | Perm  | NA    | Perm  |
| Protected Phases        | 4     | 4     |       | 8     |       | 2     | 2     |       | 6     |       | 6     |       |
| Permitted Phases        | 4     | 4     | 8     |       | 8     | 2     | 2     |       | 6     |       | 6     |       |
| Detector Phase          | 4     | 4     | 4     | 8     | 8     | 2     | 2     |       | 6     |       | 6     |       |
| Switch Phase            |       |       |       |       |       |       |       |       |       |       |       |       |
| Minimum Initial (s)     | 4.0   | 4.0   | 4.0   | 4.0   | 4.0   | 4.0   | 4.0   | 4.0   | 4.0   | 4.0   | 4.0   | 4.0   |
| Minimum Split (s)       | 23.0  | 23.0  | 23.0  | 23.0  | 23.0  | 24.0  | 24.0  | 24.0  | 24.0  | 24.0  | 24.0  | 24.0  |
| Total Split (s)         | 25.0  | 25.0  | 25.0  | 25.0  | 25.0  | 46.0  | 46.0  | 46.0  | 46.0  | 46.0  | 46.0  | 46.0  |
| Total Split (%)         | 35.2% | 35.2% | 35.2% | 35.2% | 35.2% | 64.8% | 64.8% | 64.8% | 64.8% | 64.8% | 64.8% | 64.8% |
| Yellow Time (s)         | 4.0   | 4.0   | 4.0   | 4.0   | 4.0   | 4.0   | 4.0   | 4.0   | 4.0   | 4.0   | 4.0   | 4.0   |
| All-Red Time (s)        | 1.0   | 1.0   | 1.0   | 1.0   | 1.0   | 2.0   | 2.0   | 2.0   | 2.0   | 2.0   | 2.0   | 2.0   |
| Lost Time Adjust (s)    | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   |
| Total Lost Time (s)     | 5.0   | 5.0   |       | 5.0   |       | 6.0   | 6.0   |       | 6.0   |       | 6.0   |       |
| Lead/Lag                |       |       |       |       |       |       |       |       |       |       |       |       |
| Lead-Lag Optimize?      |       |       |       |       |       |       |       |       |       |       |       |       |
| Recall Mode             | None  | None  | None  | None  | None  | Min   | Min   |       | Min   |       | Min   |       |
| Act Effct Green (s)     | 20.4  | 20.4  |       | 20.4  |       | 30.3  | 30.3  |       | 30.3  |       | 30.3  |       |
| Actuated g/C Ratio      | 0.33  | 0.33  |       | 0.33  |       | 0.49  | 0.49  |       | 0.49  |       | 0.49  |       |
| v/c Ratio               | 0.65  | 0.23  |       | 0.85  |       | 0.63  | 0.83  |       | 0.19  |       | 0.78  |       |
| Control Delay           | 30.7  | 5.2   |       | 44.3  |       | 26.8  | 21.8  |       | 11.3  |       | 19.4  |       |
| Queue Delay             | 0.0   | 0.0   |       | 0.0   |       | 0.0   | 0.0   |       | 0.0   |       | 0.0   |       |
| Total Delay             | 30.7  | 5.2   |       | 44.3  |       | 26.8  | 21.8  |       | 11.3  |       | 19.4  |       |
| LOS                     | C     | A     |       | D     |       | C     | C     |       | B     |       | B     |       |
| Approach Delay          | 21.4  |       |       | 44.3  |       | 22.5  |       |       | 19.0  |       |       |       |
| Approach LOS            | C     |       |       | D     |       | C     |       |       | B     |       |       |       |
| Queue Length 50th (ft)  | 81    | 0     |       | 130   |       | 32    | 218   |       | 6     |       | 194   |       |
| Queue Length 95th (ft)  | #212  | 38    |       | #327  |       | #96   | 347   |       | 20    |       | 309   |       |
| Internal Link Dist (ft) | 1158  |       |       | 436   |       |       | 674   |       |       |       | 195   |       |
| Turn Bay Length (ft)    |       | 100   |       |       |       | 100   |       |       | 220   |       |       |       |
| Base Capacity (vph)     | 391   | 623   |       | 439   |       | 274   | 1217  |       | 217   |       | 1196  |       |
| Starvation Cap Reductn  | 0     | 0     |       | 0     |       | 0     | 0     |       | 0     |       | 0     |       |
| Spillback Cap Reductn   | 0     | 0     |       | 0     |       | 0     | 0     |       | 0     |       | 0     |       |
| Storage Cap Reductn     | 0     | 0     |       | 0     |       | 0     | 0     |       | 0     |       | 0     |       |
| Reduced v/c Ratio       | 0.65  | 0.23  |       | 0.85  |       | 0.47  | 0.61  |       | 0.14  |       | 0.58  |       |

| Intersection Summary                                            |                        |
|-----------------------------------------------------------------|------------------------|
| Area Type:                                                      | Other                  |
| Cycle Length: 71                                                |                        |
| Actuated Cycle Length: 61.9                                     |                        |
| Natural Cycle: 60                                               |                        |
| Control Type: Actuated-Uncoordinated                            |                        |
| Maximum v/c Ratio: 0.85                                         |                        |
| Intersection Signal Delay: 24.7                                 | Intersection LOS: C    |
| Intersection Capacity Utilization 81.7%                         | ICU Level of Service D |
| Analysis Period (min) 15                                        |                        |
| # 95th percentile volume exceeds capacity, queue may be longer. |                        |
| Queue shown is maximum after two cycles.                        |                        |



12239.00 :: Needham Street  
7: Needham Street & South Site Driveway

2018 Existing Conditions  
Timing Plan: Weekday Morning

| Intersection             |      |      |      |      |      |      |
|--------------------------|------|------|------|------|------|------|
| Int Delay, s/veh         | 0    |      |      |      |      |      |
| Movement                 | EBL  | EBR  | NBL  | NBT  | SBT  | SBR  |
| Lane Configurations      | ↔    |      |      | ↔    | ↔    |      |
| Traffic Vol, veh/h       | 0    | 0    | 0    | 765  | 700  | 0    |
| Future Vol, veh/h        | 0    | 0    | 0    | 765  | 700  | 0    |
| Conflicting Peds, #/hr   | 0    | 0    | 2    | 0    | 0    | 2    |
| Sign Control             | Stop | Stop | Free | Free | Free | Free |
| RT Channelized           | -    | None | -    | None | -    | None |
| Storage Length           | 0    | -    | -    | -    | -    | -    |
| Veh in Median Storage, # | 0    | -    | -    | 0    | 0    | -    |
| Grade, %                 | 0    | -    | -    | 0    | 0    | -    |
| Peak Hour Factor         | 92   | 92   | 97   | 97   | 95   | 95   |
| Heavy Vehicles, %        | 0    | 0    | 1    | 1    | 2    | 2    |
| Mvmt Flow                | 0    | 0    | 0    | 789  | 737  | 0    |

| Major/Minor          | Minor2 | Major1 |       | Major2 |     |
|----------------------|--------|--------|-------|--------|-----|
| Conflicting Flow All | 1528   | 739    | 739   | 0      | - 0 |
| Stage 1              | 739    | -      | -     | -      | -   |
| Stage 2              | 789    | -      | -     | -      | -   |
| Critical Hdwy        | 6.4    | 6.2    | 4.11  | -      | -   |
| Critical Hdwy Stg 1  | 5.4    | -      | -     | -      | -   |
| Critical Hdwy Stg 2  | 5.4    | -      | -     | -      | -   |
| Follow-up Hdwy       | 3.5    | 3.3    | 2.209 | -      | -   |
| Pot Cap-1 Maneuver   | 131    | 421    | 872   | -      | -   |
| Stage 1              | 476    | -      | -     | -      | -   |
| Stage 2              | 451    | -      | -     | -      | -   |
| Platoon blocked, %   |        |        |       | -      | -   |
| Mov Cap-1 Maneuver   | 131    | 420    | 872   | -      | -   |
| Mov Cap-2 Maneuver   | 131    | -      | -     | -      | -   |
| Stage 1              | 475    | -      | -     | -      | -   |
| Stage 2              | 450    | -      | -     | -      | -   |

| Approach             | EB | NB | SB |
|----------------------|----|----|----|
| HCM Control Delay, s | 0  | 0  | 0  |
| HCM LOS              | A  |    |    |

| Minor Lane/Major Mvmt | NBL | NBT | EBLn1 | SBT | SBR |
|-----------------------|-----|-----|-------|-----|-----|
| Capacity (veh/h)      | 872 | -   | -     | -   | -   |
| HCM Lane V/C Ratio    | -   | -   | -     | -   | -   |
| HCM Control Delay (s) | 0   | -   | 0     | -   | -   |
| HCM Lane LOS          | A   | -   | A     | -   | -   |
| HCM 95th %ile Q(veh)  | 0   | -   | -     | -   | -   |

12239.00 :: Needham Street  
8: Needham Street & Middle Site Driveway/TJMaxx Driveway

2018 Existing Conditions  
Timing Plan: Weekday Morning

| Intersection             |      |      |      |      |      |      |      |      |      |      |      |      |
|--------------------------|------|------|------|------|------|------|------|------|------|------|------|------|
| Int Delay, s/veh         | 0.5  |      |      |      |      |      |      |      |      |      |      |      |
| Movement                 | EBL  | EBT  | EBR  | WBL  | WBT  | WBR  | NBL  | NBT  | NBR  | SBL  | SBT  | SBR  |
| Lane Configurations      |      | ↔    |      |      |      |      | ↔    | ↔    |      | ↔    | ↔    |      |
| Traffic Vol, veh/h       | 5    | 0    | 20   | 0    | 0    | 0    | 15   | 700  | 2    | 5    | 680  | 0    |
| Future Vol, veh/h        | 5    | 0    | 20   | 0    | 0    | 0    | 15   | 700  | 2    | 5    | 680  | 0    |
| Conflicting Peds, #/hr   | 0    | 0    | 0    | 0    | 0    | 0    | 2    | 0    | 8    | 8    | 0    | 2    |
| Sign Control             | Stop | Stop | Stop | Stop | Stop | Stop | Free | Free | Free | Free | Free | Free |
| RT Channelized           | -    | -    | None | -    | -    | None | -    | -    | None | -    | -    | None |
| Storage Length           | -    | -    | -    | -    | -    | -    | 120  | -    | -    | 80   | -    | -    |
| Veh in Median Storage, # | -    | 0    | -    | -    | -    | -    | 0    | -    | -    | 0    | -    | -    |
| Grade, %                 | -    | 0    | -    | -    | 0    | -    | -    | 0    | -    | -    | 0    | -    |
| Peak Hour Factor         | 82   | 82   | 82   | 92   | 92   | 92   | 97   | 97   | 97   | 96   | 96   | 96   |
| Heavy Vehicles, %        | 4    | 4    | 4    | 0    | 0    | 0    | 1    | 1    | 1    | 2    | 2    | 2    |
| Mvmt Flow                | 6    | 0    | 24   | 0    | 0    | 0    | 15   | 722  | 2    | 5    | 708  | 0    |

| Major/Minor          | Minor2 | Major1 |       |       | Major2 |   |       |
|----------------------|--------|--------|-------|-------|--------|---|-------|
| Conflicting Flow All | 1475   | 1484   | 710   | 710   | 0      | 0 | 732   |
| Stage 1              | 721    | -      | -     | -     | -      | - | -     |
| Stage 2              | 754    | 763    | -     | -     | -      | - | -     |
| Critical Hdwy        | 6.44   | 6.54   | 6.24  | 4.11  | -      | - | 4.12  |
| Critical Hdwy Stg 1  | 5.44   | 5.54   | -     | -     | -      | - | -     |
| Critical Hdwy Stg 2  | 5.44   | 5.54   | -     | -     | -      | - | -     |
| Follow-up Hdwy       | 3.536  | 4.036  | 3.336 | 2.209 | -      | - | 2.218 |
| Pot Cap-1 Maneuver   | 138    | 124    | 430   | 894   | -      | - | 873   |
| Stage 1              | 478    | 429    | -     | -     | -      | - | -     |
| Stage 2              | 461    | 410    | -     | -     | -      | - | -     |
| Platoon blocked, %   |        |        |       | -     | -      | - | -     |
| Mov Cap-1 Maneuver   | 134    | 0      | 429   | 894   | -      | - | 873   |
| Mov Cap-2 Maneuver   | 134    | 0      | -     | -     | -      | - | -     |
| Stage 1              | 474    | 0      | -     | -     | -      | - | -     |
| Stage 2              | 453    | 0      | -     | -     | -      | - | -     |

| Approach             | EB   | NB  | SB  |
|----------------------|------|-----|-----|
| HCM Control Delay, s | 18.5 | 0.2 | 0.1 |
| HCM LOS              | C    |     |     |

| Minor Lane/Major Mvmt | NBL   | NBT | NBR | EBLn1 | SBL   | SBT | SBR |
|-----------------------|-------|-----|-----|-------|-------|-----|-----|
| Capacity (veh/h)      | 894   | -   | -   | 298   | 873   | -   | -   |
| HCM Lane V/C Ratio    | 0.017 | -   | -   | 0.102 | 0.006 | -   | -   |
| HCM Control Delay (s) | 9.1   | -   | -   | 18.5  | 9.1   | -   | -   |
| HCM Lane LOS          | A     | -   | -   | C     | A     | -   | -   |
| HCM 95th %ile Q(veh)  | 0.1   | -   | -   | 0.3   | 0     | -   | -   |

12239.00 :: Needham Street  
9: Needham Street & North Site Driveway/Charlemont Street

2018 Existing Conditions  
Timing Plan: Weekday Morning

| Intersection             |        |      |        |       |        |       |        |      |      |       |      |      |
|--------------------------|--------|------|--------|-------|--------|-------|--------|------|------|-------|------|------|
| Int Delay, s/veh         | 1.6    |      |        |       |        |       |        |      |      |       |      |      |
| Movement                 | EBL    | EBT  | EBR    | WBL   | WBT    | WBR   | NBL    | NBT  | NBR  | SBL   | SBT  | SBR  |
| Lane Configurations      |        | ↕    |        |       | ↕      |       | ↕      | ↕    |      | ↕     | ↕    |      |
| Traffic Vol, veh/h       | 5      | 0    | 5      | 20    | 0      | 15    | 15     | 665  | 25   | 5     | 660  | 15   |
| Future Vol, veh/h        | 5      | 0    | 5      | 20    | 0      | 15    | 15     | 665  | 25   | 5     | 660  | 15   |
| Conflicting Peds, #/hr   | 1      | 0    | 0      | 0     | 0      | 1     | 2      | 0    | 6    | 6     | 0    | 2    |
| Sign Control             | Stop   | Stop | Stop   | Stop  | Stop   | Stop  | Free   | Free | Free | Free  | Free | Free |
| RT Channelized           | -      | -    | None   | -     | -      | None  | -      | -    | None | -     | -    | None |
| Storage Length           | -      | -    | -      | -     | -      | -     | 80     | -    | -    | 230   | -    | -    |
| Veh in Median Storage, # | -      | 0    | -      | -     | 0      | -     | -      | 0    | -    | -     | 0    | -    |
| Grade, %                 | -      | 0    | -      | -     | 0      | -     | -      | 0    | -    | -     | 0    | -    |
| Peak Hour Factor         | 67     | 67   | 67     | 75    | 75     | 75    | 97     | 97   | 97   | 96    | 96   | 96   |
| Heavy Vehicles, %        | 0      | 0    | 0      | 0     | 0      | 0     | 2      | 2    | 2    | 2     | 2    | 2    |
| Mvmt Flow                | 7      | 0    | 7      | 27    | 0      | 20    | 15     | 686  | 26   | 5     | 688  | 16   |
|                          |        |      |        |       |        |       |        |      |      |       |      |      |
| Major/Minor              | Minor2 |      | Minor1 |       | Major1 |       | Major2 |      |      |       |      |      |
| Conflicting Flow All     | 1448   | 1456 | 697    | 1444  | 1451   | 705   | 705    | 0    | 0    | 717   | 0    | 0    |
| Stage 1                  | 708    | 708  | -      | 735   | 735    | -     | -      | -    | -    | -     | -    | -    |
| Stage 2                  | 740    | 748  | -      | 709   | 716    | -     | -      | -    | -    | -     | -    | -    |
| Critical Hdwy            | 7.1    | 6.5  | 6.2    | 7.1   | 6.5    | 6.2   | 4.12   | -    | -    | 4.12  | -    | -    |
| Critical Hdwy Stg 1      | 6.1    | 5.5  | -      | 6.1   | 5.5    | -     | -      | -    | -    | -     | -    | -    |
| Critical Hdwy Stg 2      | 6.1    | 5.5  | -      | 6.1   | 5.5    | -     | -      | -    | -    | -     | -    | -    |
| Follow-up Hdwy           | 3.5    | 4    | 3.3    | 3.5   | 4      | 3.3   | 2.218  | -    | -    | 2.218 | -    | -    |
| Pot Cap-1 Maneuver       | 110    | 131  | 444    | 111   | 132    | 440   | 893    | -    | -    | 884   | -    | -    |
| Stage 1                  | 429    | 441  | -      | 414   | 428    | -     | -      | -    | -    | -     | -    | -    |
| Stage 2                  | 412    | 423  | -      | 428   | 437    | -     | -      | -    | -    | -     | -    | -    |
| Platoon blocked, %       | -      | -    | -      | -     | -      | -     | -      | -    | -    | -     | -    | -    |
| Mov Cap-1 Maneuver       | 103    | 127  | 443    | 107   | 128    | 437   | 893    | -    | -    | 883   | -    | -    |
| Mov Cap-2 Maneuver       | 103    | 127  | -      | 107   | 128    | -     | -      | -    | -    | -     | -    | -    |
| Stage 1                  | 421    | 438  | -      | 405   | 419    | -     | -      | -    | -    | -     | -    | -    |
| Stage 2                  | 386    | 414  | -      | 418   | 434    | -     | -      | -    | -    | -     | -    | -    |
|                          |        |      |        |       |        |       |        |      |      |       |      |      |
| Approach                 | EB     |      | WB     |       | NB     |       | SB     |      |      |       |      |      |
| HCM Control Delay, s     | 28.7   |      | 37.1   |       | 0.2    |       | 0.1    |      |      |       |      |      |
| HCM LOS                  | D      |      | E      |       |        |       |        |      |      |       |      |      |
|                          |        |      |        |       |        |       |        |      |      |       |      |      |
| Minor Lane/Major Mvmt    | NBL    | NBT  | NBR    | EBLn1 | WBLn1  | SBL   | SBT    | SBR  |      |       |      |      |
| Capacity (veh/h)         | 893    | -    | -      | 167   | 158    | 883   | -      | -    |      |       |      |      |
| HCM Lane V/C Ratio       | 0.017  | -    | -      | 0.089 | 0.295  | 0.006 | -      | -    |      |       |      |      |
| HCM Control Delay (s)    | 9.1    | -    | -      | 28.7  | 37.1   | 9.1   | -      | -    |      |       |      |      |
| HCM Lane LOS             | A      | -    | -      | D     | E      | A     | -      | -    |      |       |      |      |
| HCM 95th %tile Q(veh)    | 0.1    | -    | -      | 0.3   | 1.2    | 0     | -      | -    |      |       |      |      |

12239.00 :: Needham Street  
10: Needham Street & Tower Road/Industrial Place

2018 Existing Conditions  
Timing Plan: Weekday Morning

| Intersection             |        |       |        |       |        |       |        |      |      |       |      |      |
|--------------------------|--------|-------|--------|-------|--------|-------|--------|------|------|-------|------|------|
| Int Delay, s/veh         | 1.1    |       |        |       |        |       |        |      |      |       |      |      |
| Movement                 | EBL    | EBT   | EBR    | WBL   | WBT    | WBR   | NBL    | NBT  | NBR  | SBL   | SBT  | SBR  |
| Lane Configurations      |        | ↕     |        |       | ↕      |       |        | ↕    |      |       | ↕    |      |
| Traffic Vol, veh/h       | 5      | 0     | 15     | 5     | 0      | 10    | 15     | 655  | 15   | 5     | 715  | 20   |
| Future Vol, veh/h        | 5      | 0     | 15     | 5     | 0      | 10    | 15     | 655  | 15   | 5     | 715  | 20   |
| Conflicting Peds, #/hr   | 0      | 0     | 1      | 1     | 0      | 0     | 4      | 0    | 2    | 2     | 0    | 4    |
| Sign Control             | Stop   | Stop  | Stop   | Stop  | Stop   | Stop  | Free   | Free | Free | Free  | Free | Free |
| RT Channelized           | -      | -     | None   | -     | -      | None  | -      | -    | None | -     | -    | None |
| Storage Length           | -      | -     | -      | -     | -      | -     | -      | -    | -    | -     | -    | -    |
| Veh in Median Storage, # | -      | 0     | -      | -     | 0      | -     | -      | 0    | -    | -     | 0    | -    |
| Grade, %                 | -      | 0     | -      | -     | 0      | -     | -      | 0    | -    | -     | 0    | -    |
| Peak Hour Factor         | 68     | 68    | 68     | 63    | 63     | 63    | 92     | 92   | 92   | 92    | 92   | 92   |
| Heavy Vehicles, %        | 5      | 5     | 5      | 13    | 13     | 13    | 3      | 3    | 3    | 2     | 2    | 2    |
| Mvmt Flow                | 7      | 0     | 22     | 8     | 0      | 16    | 16     | 712  | 16   | 5     | 777  | 22   |
|                          |        |       |        |       |        |       |        |      |      |       |      |      |
| Major/Minor              | Minor2 |       | Minor1 |       | Major1 |       | Major2 |      |      |       |      |      |
| Conflicting Flow All     | 1564   | 1566  | 793    | 1566  | 1569   | 722   | 803    | 0    | 0    | 730   | 0    | 0    |
| Stage 1                  | 803    | 803   | -      | 755   | 755    | -     | -      | -    | -    | -     | -    | -    |
| Stage 2                  | 761    | 763   | -      | 811   | 814    | -     | -      | -    | -    | -     | -    | -    |
| Critical Hdwy            | 7.15   | 6.55  | 6.25   | 7.23  | 6.63   | 6.33  | 4.13   | -    | -    | 4.12  | -    | -    |
| Critical Hdwy Stg 1      | 6.15   | 5.55  | -      | 6.23  | 5.63   | -     | -      | -    | -    | -     | -    | -    |
| Critical Hdwy Stg 2      | 6.15   | 5.55  | -      | 6.23  | 5.63   | -     | -      | -    | -    | -     | -    | -    |
| Follow-up Hdwy           | 3.545  | 4.045 | 3.345  | 3.617 | 4.117  | 3.417 | 2.227  | -    | -    | 2.218 | -    | -    |
| Pot Cap-1 Maneuver       | 89     | 109   | 384    | 85    | 105    | 409   | 816    | -    | -    | 874   | -    | -    |
| Stage 1                  | 373    | 392   | -      | 384   | 401    | -     | -      | -    | -    | -     | -    | -    |
| Stage 2                  | 393    | 409   | -      | 358   | 376    | -     | -      | -    | -    | -     | -    | -    |
| Platoon blocked, %       | -      | -     | -      | -     | -      | -     | -      | -    | -    | -     | -    | -    |
| Mov Cap-1 Maneuver       | 82     | 104   | 382    | 77    | 100    | 408   | 815    | -    | -    | 874   | -    | -    |
| Mov Cap-2 Maneuver       | 82     | 104   | -      | 77    | 100    | -     | -      | -    | -    | -     | -    | -    |
| Stage 1                  | 359    | 387   | -      | 371   | 387    | -     | -      | -    | -    | -     | -    | -    |
| Stage 2                  | 365    | 395   | -      | 334   | 371    | -     | -      | -    | -    | -     | -    | -    |
|                          |        |       |        |       |        |       |        |      |      |       |      |      |
| Approach                 | EB     |       | WB     |       | NB     |       | SB     |      |      |       |      |      |
| HCM Control Delay, s     | 26.1   |       | 29.9   |       | 0.2    |       | 0.1    |      |      |       |      |      |
| HCM LOS                  | D      |       | D      |       |        |       |        |      |      |       |      |      |
|                          |        |       |        |       |        |       |        |      |      |       |      |      |
| Minor Lane/Major Mvmt    | NBL    | NBT   | NBR    | EBLn1 | WBLn1  | SBL   | SBT    | SBR  |      |       |      |      |
| Capacity (veh/h)         | 815    | -     | -      | 200   | 168    | 874   | -      | -    |      |       |      |      |
| HCM Lane V/C Ratio       | 0.02   | -     | -      | 0.147 | 0.142  | 0.006 | -      | -    |      |       |      |      |
| HCM Control Delay (s)    | 9.5    | 0     | -      | 26.1  | 29.9   | 9.1   | 0      | -    |      |       |      |      |
| HCM Lane LOS             | A      | A     | -      | D     | D      | A     | A      | -    |      |       |      |      |
| HCM 95th %tile Q(veh)    | 0.1    | -     | -      | 0.5   | 0.5    | 0     | -      | -    |      |       |      |      |

12239.00 :: Needham Street  
11: Needham Street & Jaconnet Street

2018 Existing Conditions  
Timing Plan: Weekday Morning

| Intersection             |        |       |        |       |       |      |
|--------------------------|--------|-------|--------|-------|-------|------|
| Int Delay, s/veh         | 0.3    |       |        |       |       |      |
| Movement                 | WBL    | WBR   | NBT    | NBR   | SBL   | SBT  |
| Lane Configurations      | W      |       | W      |       | W     | W    |
| Traffic Vol, veh/h       | 5      | 10    | 640    | 20    | 2     | 735  |
| Future Vol, veh/h        | 5      | 10    | 640    | 20    | 2     | 735  |
| Conflicting Peds, #/hr   | 0      | 1     | 0      | 17    | 17    | 0    |
| Sign Control             | Stop   | Stop  | Free   | Free  | Free  | Free |
| RT Channelized           | -      | None  | -      | None  | -     | None |
| Storage Length           | 0      | -     | -      | -     | -     | -    |
| Veh in Median Storage, # | 0      | -     | 0      | -     | -     | 0    |
| Grade, %                 | 0      | -     | 0      | -     | -     | 0    |
| Peak Hour Factor         | 70     | 70    | 97     | 97    | 98    | 98   |
| Heavy Vehicles, %        | 0      | 0     | 2      | 2     | 2     | 2    |
| Mvmt Flow                | 7      | 14    | 660    | 21    | 2     | 750  |
| Major/Minor              |        |       |        |       |       |      |
| Minor1                   | Major1 |       | Major2 |       |       |      |
| Conflicting Flow All     | 1441   | 688   | 0      | 0     | 697   | 0    |
| Stage 1                  | 687    | -     | -      | -     | -     | -    |
| Stage 2                  | 754    | -     | -      | -     | -     | -    |
| Critical Hdwy            | 6.4    | 6.2   | -      | -     | 4.12  | -    |
| Critical Hdwy Stg 1      | 5.4    | -     | -      | -     | -     | -    |
| Critical Hdwy Stg 2      | 5.4    | -     | -      | -     | -     | -    |
| Follow-up Hdwy           | 3.5    | 3.3   | -      | -     | 2.218 | -    |
| Pot Cap-1 Maneuver       | 148    | 450   | -      | -     | 899   | -    |
| Stage 1                  | 503    | -     | -      | -     | -     | -    |
| Stage 2                  | 468    | -     | -      | -     | -     | -    |
| Platoon blocked, %       |        |       | -      | -     | -     | -    |
| Mov Cap-1 Maneuver       | 145    | 443   | -      | -     | 898   | -    |
| Mov Cap-2 Maneuver       | 145    | -     | -      | -     | -     | -    |
| Stage 1                  | 496    | -     | -      | -     | -     | -    |
| Stage 2                  | 466    | -     | -      | -     | -     | -    |
| Approach                 |        |       |        |       |       |      |
| WB                       | NB     |       | SB     |       |       |      |
| HCM Control Delay, s     | 19.9   | 0     |        |       | 0     |      |
| HCM LOS                  | C      |       |        |       |       |      |
| Minor Lane/Major Mvmt    |        |       |        |       |       |      |
| NBT                      | NBR    | WBLn1 | SBL    | SBT   |       |      |
| Capacity (veh/h)         | -      | -     | 263    | 898   | -     | -    |
| HCM Lane V/C Ratio       | -      | -     | 0.081  | 0.002 | -     | -    |
| HCM Control Delay (s)    | -      | -     | 19.9   | 9     | 0     | -    |
| HCM Lane LOS             | -      | -     | C      | A     | A     | -    |
| HCM 95th %ile Q(veh)     | -      | -     | 0.3    | 0     | -     | -    |

12239.00 :: Needham Street  
12: Needham Street & Rockland Street

2018 Existing Conditions  
Timing Plan: Weekday Morning

| Intersection             |        |       |        |       |       |      |
|--------------------------|--------|-------|--------|-------|-------|------|
| Int Delay, s/veh         | 0.2    |       |        |       |       |      |
| Movement                 | WBL    | WBR   | NBT    | NBR   | SBL   | SBT  |
| Lane Configurations      | W      |       | W      |       | W     | W    |
| Traffic Vol, veh/h       | 5      | 5     | 640    | 5     | 10    | 740  |
| Future Vol, veh/h        | 5      | 5     | 640    | 5     | 10    | 740  |
| Conflicting Peds, #/hr   | 1      | 0     | 0      | 9     | 9     | 0    |
| Sign Control             | Stop   | Stop  | Free   | Free  | Free  | Free |
| RT Channelized           | -      | None  | -      | None  | -     | None |
| Storage Length           | 0      | -     | -      | -     | 125   | -    |
| Veh in Median Storage, # | 0      | -     | 0      | -     | -     | 0    |
| Grade, %                 | 0      | -     | 0      | -     | -     | 0    |
| Peak Hour Factor         | 83     | 83    | 98     | 98    | 99    | 99   |
| Heavy Vehicles, %        | 0      | 0     | 2      | 2     | 2     | 2    |
| Mvmt Flow                | 6      | 6     | 653    | 5     | 10    | 747  |
| Major/Minor              |        |       |        |       |       |      |
| Minor1                   | Major1 |       | Major2 |       |       |      |
| Conflicting Flow All     | 1434   | 665   | 0      | 0     | 667   | 0    |
| Stage 1                  | 665    | -     | -      | -     | -     | -    |
| Stage 2                  | 769    | -     | -      | -     | -     | -    |
| Critical Hdwy            | 6.4    | 6.2   | -      | -     | 4.12  | -    |
| Critical Hdwy Stg 1      | 5.4    | -     | -      | -     | -     | -    |
| Critical Hdwy Stg 2      | 5.4    | -     | -      | -     | -     | -    |
| Follow-up Hdwy           | 3.5    | 3.3   | -      | -     | 2.218 | -    |
| Pot Cap-1 Maneuver       | 149    | 464   | -      | -     | 923   | -    |
| Stage 1                  | 515    | -     | -      | -     | -     | -    |
| Stage 2                  | 461    | -     | -      | -     | -     | -    |
| Platoon blocked, %       |        |       | -      | -     | -     | -    |
| Mov Cap-1 Maneuver       | 146    | 461   | -      | -     | 923   | -    |
| Mov Cap-2 Maneuver       | 146    | -     | -      | -     | -     | -    |
| Stage 1                  | 511    | -     | -      | -     | -     | -    |
| Stage 2                  | 456    | -     | -      | -     | -     | -    |
| Approach                 |        |       |        |       |       |      |
| WB                       | NB     |       | SB     |       |       |      |
| HCM Control Delay, s     | 22.1   | 0     |        |       | 0.1   |      |
| HCM LOS                  | C      |       |        |       |       |      |
| Minor Lane/Major Mvmt    |        |       |        |       |       |      |
| NBT                      | NBR    | WBLn1 | SBL    | SBT   |       |      |
| Capacity (veh/h)         | -      | -     | 222    | 923   | -     | -    |
| HCM Lane V/C Ratio       | -      | -     | 0.054  | 0.011 | -     | -    |
| HCM Control Delay (s)    | -      | -     | 22.1   | 8.9   | -     | -    |
| HCM Lane LOS             | -      | -     | C      | A     | -     | -    |
| HCM 95th %ile Q(veh)     | -      | -     | 0.2    | 0     | -     | -    |



12239.00 :: Needham Street  
13: Needham Street & Avalon Driveway/Columbia Avenue

2018 Existing Conditions  
Timing Plan: Weekday Morning

| Lane Group              | EBL   | EBT   | EBR   | WBL   | WBT   | WBR   | NBL   | NBT   | NBR  | SBL   | SBT   | SBR  |
|-------------------------|-------|-------|-------|-------|-------|-------|-------|-------|------|-------|-------|------|
| Lane Configurations     |       |       |       |       |       |       |       |       |      |       |       |      |
| Traffic Volume (vph)    | 25    | 0     | 25    | 15    | 5     | 15    | 15    | 630   | 1    | 1     | 735   | 15   |
| Future Volume (vph)     | 25    | 0     | 25    | 15    | 5     | 15    | 15    | 630   | 1    | 1     | 735   | 15   |
| Ideal Flow (vphpl)      | 1900  | 1900  | 1900  | 1900  | 1900  | 1900  | 1900  | 1900  | 1900 | 1900  | 1900  | 1900 |
| Storage Length (ft)     | 0     |       | 50    | 0     |       | 0     | 125   | 0     |      | 560   | 0     | 0    |
| Storage Lanes           | 0     |       | 1     | 0     |       | 0     | 1     | 0     |      | 1     | 0     | 0    |
| Taper Length (ft)       | 25    |       |       | 25    |       |       | 25    |       |      | 25    |       |      |
| Satd. Flow (prot)       | 0     | 1736  | 1553  | 0     | 1718  | 0     | 1752  | 1845  | 0    | 1770  | 1856  | 0    |
| Flt Permitted           |       |       |       | 0.844 |       | 0.249 |       |       |      | 0.357 |       |      |
| Satd. Flow (perm)       | 0     | 1782  | 1516  | 0     | 1478  | 0     | 457   | 1845  | 0    | 661   | 1856  | 0    |
| Right Turn on Red       |       | Yes   |       |       | Yes   |       |       | Yes   |      |       | Yes   |      |
| Satd. Flow (RTOR)       |       | 43    |       |       | 21    |       |       |       |      | 4     |       |      |
| Link Speed (mph)        |       | 30    |       |       | 30    |       |       | 30    |      |       | 30    |      |
| Link Distance (ft)      |       | 190   |       |       | 435   |       |       | 338   |      |       | 1135  |      |
| Travel Time (s)         |       | 4.3   |       |       | 9.9   |       |       | 7.7   |      |       | 25.8  |      |
| Confl. Peds. (#/hr)     | 11    |       | 2     | 2     |       | 11    | 8     |       | 5    | 5     |       | 8    |
| Confl. Bikes (#/hr)     |       |       |       |       |       |       |       | 1     |      |       |       |      |
| Peak Hour Factor        | 0.67  | 0.67  | 0.67  | 0.73  | 0.73  | 0.73  | 0.95  | 0.95  | 0.95 | 0.91  | 0.91  | 0.91 |
| Heavy Vehicles (%)      | 4%    | 4%    | 4%    | 0%    | 0%    | 0%    | 3%    | 3%    | 3%   | 2%    | 2%    | 2%   |
| Shared Lane Traffic (%) |       |       |       |       |       |       |       |       |      |       |       |      |
| Lane Group Flow (vph)   | 0     | 37    | 37    | 0     | 49    | 0     | 16    | 664   | 0    | 1     | 824   | 0    |
| Turn Type               | Perm  | NA    | Perm  | Perm  | NA    |       | Perm  | NA    |      | Perm  | NA    |      |
| Protected Phases        |       | 8     |       | 4     |       |       | 4     |       | 2    |       | 6     |      |
| Permitted Phases        | 8     |       | 8     | 4     |       |       | 2     |       |      | 6     |       |      |
| Detector Phase          | 8     | 8     | 8     | 4     | 4     |       | 2     | 2     |      | 6     | 6     |      |
| Switch Phase            |       |       |       |       |       |       |       |       |      |       |       |      |
| Minimum Initial (s)     | 4.0   | 4.0   | 4.0   | 4.0   | 4.0   |       | 10.0  | 10.0  |      | 10.0  | 10.0  |      |
| Minimum Split (s)       | 25.0  | 25.0  | 25.0  | 22.0  | 22.0  |       | 17.0  | 17.0  |      | 23.0  | 23.0  |      |
| Total Split (s)         | 12.0  | 12.0  | 12.0  | 12.0  | 12.0  |       | 65.0  | 65.0  |      | 65.0  | 65.0  |      |
| Total Split (%)         | 15.6% | 15.6% | 15.6% | 15.6% | 15.6% |       | 84.4% | 84.4% |      | 84.4% | 84.4% |      |
| Yellow Time (s)         | 4.0   | 4.0   | 4.0   | 4.0   | 4.0   |       | 4.0   | 4.0   |      | 4.0   | 4.0   |      |
| All-Red Time (s)        | 2.0   | 2.0   | 2.0   | 2.0   | 2.0   |       | 2.0   | 2.0   |      | 2.0   | 2.0   |      |
| Lost Time Adjust (s)    | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   |       | 0.0   | 0.0   |      | 0.0   | 0.0   |      |
| Total Lost Time (s)     | 6.0   | 6.0   | 6.0   | 6.0   | 6.0   |       | 6.0   | 6.0   |      | 6.0   | 6.0   |      |
| Lead/Lag                |       |       |       |       |       |       |       |       |      |       |       |      |
| Lead-Lag Optimize?      |       |       |       |       |       |       |       |       |      |       |       |      |
| Recall Mode             | None  | None  | None  | None  | None  |       | None  | None  |      | None  | None  |      |
| Act Effect Green (s)    | 8.5   | 8.5   | 8.5   | 8.4   | 8.4   |       | 30.8  | 30.8  |      | 30.8  | 30.8  |      |
| Actuated g/C Ratio      | 0.21  | 0.21  | 0.21  | 0.21  | 0.21  |       | 0.76  | 0.76  |      | 0.76  | 0.76  |      |
| v/c Ratio               | 0.10  | 0.11  | 0.11  | 0.15  | 0.15  |       | 0.05  | 0.47  |      | 0.00  | 0.58  |      |
| Control Delay           | 21.2  | 8.5   | 16.2  |       |       |       | 5.3   | 6.9   |      | 5.0   | 8.5   |      |
| Queue Delay             | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   |       | 0.0   | 0.0   |      | 0.0   | 0.0   |      |
| Total Delay             | 21.2  | 8.5   | 16.2  |       |       |       | 5.3   | 6.9   |      | 5.0   | 8.5   |      |
| LOS                     | C     | A     |       | B     |       |       | A     | A     |      | A     |       |      |
| Approach Delay          | 14.9  |       |       | 16.2  |       |       | 6.8   |       |      | 8.5   |       |      |
| Approach LOS            | B     |       |       | B     |       |       | A     |       |      | A     |       |      |
| Queue Length 50th (ft)  | 8     | 0     |       | 6     |       |       | 1     | 83    |      | 0     | 118   |      |
| Queue Length 95th (ft)  | 29    | 11    |       | 30    |       |       | 10    | 273   |      | 2     | 391   |      |
| Internal Link Dist (ft) | 110   |       |       | 355   |       |       | 258   |       |      | 1055  |       |      |
| Turn Bay Length (ft)    |       | 50    |       |       |       |       | 125   |       |      | 560   |       |      |
| Base Capacity (vph)     | 436   | 404   |       | 378   |       |       | 429   | 1734  |      | 621   | 1744  |      |
| Starvation Cap Reductn  | 0     | 0     |       | 0     |       |       | 0     | 0     |      | 0     | 0     |      |
| Spillback Cap Reductn   | 0     | 0     |       | 0     |       |       | 0     | 0     |      | 0     | 0     |      |
| Storage Cap Reductn     | 0     | 0     |       | 0     |       |       | 0     | 0     |      | 0     | 0     |      |
| Reduced v/c Ratio       | 0.08  | 0.09  |       | 0.13  |       |       | 0.04  | 0.38  |      | 0.00  | 0.47  |      |

| Intersection Summary                    |                        |
|-----------------------------------------|------------------------|
| Area Type:                              | Other                  |
| Cycle Length: 77                        |                        |
| Actuated Cycle Length: 40.6             |                        |
| Natural Cycle: 60                       |                        |
| Control Type: Actuated-Uncoordinated    |                        |
| Maximum v/c Ratio: 0.58                 |                        |
| Intersection Signal Delay: 8.3          | Intersection LOS: A    |
| Intersection Capacity Utilization 65.2% | ICU Level of Service C |
| Analysis Period (min) 15                |                        |

Splits and Phases: 13: Needham Street & Avalon Driveway/Columbia Avenue



12239.00 :: Needham Street  
14: Winchester Street & Needham Street/Dedham Street

2018 Existing Conditions  
Timing Plan: Weekday Morning

| Lane Group              | EBL   | EBT   | EBR   | WBL   | WBT   | WBR  | NBL   | NBT   | NBR  | SBL   | SBT   | SBR  | Ø9 |
|-------------------------|-------|-------|-------|-------|-------|------|-------|-------|------|-------|-------|------|----|
| Lane Configurations     |       |       |       |       |       |      |       |       |      |       |       |      |    |
| Traffic Volume (vph)    | 625   | 90    | 40    | 15    | 110   | 145  | 25    | 265   | 5    | 45    | 270   | 635  |    |
| Future Volume (vph)     | 625   | 90    | 40    | 15    | 110   | 145  | 25    | 265   | 5    | 45    | 270   | 635  |    |
| Ideal Flow (vphpl)      | 1900  | 1900  | 1900  | 1900  | 1900  | 1900 | 1900  | 1900  | 1900 | 1900  | 1900  | 1900 |    |
| Storage Length (ft)     | 340   |       | 75    | 0     |       | 0    | 50    | 0     |      | 0     | 0     | 0    |    |
| Storage Lanes           | 1     |       | 1     | 0     |       | 0    | 0     | 0     |      | 0     | 0     | 1    |    |
| Taper Length (ft)       | 25    |       |       | 25    |       |      | 25    |       |      | 25    |       |      |    |
| Satd. Flow (prot)       | 1681  | 1706  | 1583  | 0     | 1724  | 0    | 0     | 1851  | 0    | 0     | 1868  | 1599 |    |
| Flt Permitted           | 0.950 | 0.964 |       |       | 0.411 |      |       | 0.699 |      |       | 0.750 |      |    |
| Satd. Flow (perm)       | 1667  | 1695  | 1548  | 0     | 711   | 0    | 0     | 1299  | 0    | 0     | 1411  | 1599 |    |
| Right Turn on Red       |       | Yes   |       |       | No    |      |       | Yes   |      |       | Yes   |      |    |
| Satd. Flow (RTOR)       |       | 98    |       |       |       |      |       | 1     |      |       | 555   |      |    |
| Link Speed (mph)        |       | 30    |       |       | 30    |      |       | 30    |      |       | 30    |      |    |
| Link Distance (ft)      |       | 1135  |       |       | 451   |      |       | 634   |      |       | 722   |      |    |
| Travel Time (s)         |       | 25.8  |       |       | 10.3  |      |       | 14.4  |      |       | 16.4  |      |    |
| Confl. Peds. (#/hr)     | 5     |       | 1     | 1     |       | 5    |       |       |      |       |       |      |    |
| Confl. Bikes (#/hr)     |       |       |       |       |       |      |       |       |      |       |       |      |    |
| Peak Hour Factor        | 0.92  | 0.92  | 0.92  | 0.91  | 0.91  | 0.91 | 0.82  | 0.82  | 0.82 | 0.95  | 0.95  | 0.95 |    |
| Heavy Vehicles (%)      | 2%    | 2%    | 2%    | 0%    | 0%    | 0%   | 2%    | 2%    | 2%   | 1%    | 1%    | 1%   |    |
| Shared Lane Traffic (%) | 43%   |       |       |       |       |      |       |       |      |       |       |      |    |
| Lane Group Flow (vph)   | 387   | 390   | 43    | 0     | 296   | 0    | 0     | 359   | 0    | 0     | 331   | 668  |    |
| Turn Type               | Split | NA    | Perm  | Perm  | NA    |      | Perm  | NA    |      | Perm  | NA    | Free |    |
| Protected Phases        | 6     | 6     |       |       | 2     |      |       | 8     |      | 4     |       | 9    |    |
| Permitted Phases        |       |       | 6     | 2     |       |      | 8     |       |      | 4     |       | Free |    |
| Detector Phase          | 6     | 6     | 6     | 2     | 2     |      | 8     | 8     |      | 4     | 4     |      |    |
| Switch Phase            |       |       |       |       |       |      |       |       |      |       |       |      |    |
| Minimum Initial (s)     | 10.0  | 10.0  | 10.0  | 6.0   | 6.0   |      | 6.0   | 6.0   |      | 6.0   | 6.0   | 7.0  |    |
| Minimum Split (s)       | 19.0  | 19.0  | 19.0  | 19.0  | 19.0  |      | 21.0  | 21.0  |      | 21.0  | 21.0  | 24.0 |    |
| Total Split (s)         | 35.0  | 35.0  | 35.0  | 31.0  | 31.0  |      | 54.0  | 54.0  |      | 54.0  | 54.0  | 24.0 |    |
| Total Split (%)         | 24.3% | 24.3% | 24.3% | 21.5% | 21.5% |      | 37.5% | 37.5% |      | 37.5% | 37.5% | 17%  |    |
| Yellow Time (s)         | 4.0   | 4.0   | 4.0   | 3.0   | 3.0   |      | 4.0   | 4.0   |      | 4.0   | 4.0   | 3.0  |    |
| All-Red Time (s)        | 3.0   | 3.0   | 3.0   | 3.0   | 3.0   |      | 3.0   | 3.0   |      | 3.0   | 3.0   | 0.0  |    |
| Lost Time Adjust (s)    | 0.0   | 0.0   | 0.0   |       | 0.0   |      |       | 0.0   |      |       | 0.0   |      |    |
| Total Lost Time (s)     | 7.0   | 7.0   | 7.0   |       | 6.0   |      |       | 7.0   |      |       | 7.0   |      |    |
| Lead/Lag                |       |       |       |       |       |      |       |       |      |       |       |      |    |
| Lead-Lag Optimize?      |       |       |       |       |       |      |       |       |      |       |       |      |    |
| Recall Mode             | C-Min | C-Min | C-Min | Min   | Min   |      | None  | None  |      | None  | None  | None |    |
| Act Effect Green (s)    | 28.0  | 28.0  | 28.0  |       | 53.8  |      |       | 37.4  |      | 37.4  | 144.0 |      |    |
| Actuated g/C Ratio      | 0.19  | 0.19  | 0.19  |       | 0.37  |      |       | 0.26  |      | 0.26  | 1.00  |      |    |
| v/c Ratio               | 1.19  | 1.18  | 1.11  |       | 1.12  |      |       | 1.07  |      | 0.90  | 0.42  |      |    |
| Control Delay           | 159.7 | 156.3 | 0.6   |       | 130.6 |      |       | 116.8 |      | 79.2  | 0.8   |      |    |
| Queue Delay             | 0.0   | 0.0   | 0.0   |       | 0.0   |      |       | 0.0   |      | 0.0   | 0.0   |      |    |
| Total Delay             | 159.7 | 156.3 | 0.6   |       | 130.6 |      |       | 116.8 |      | 79.2  | 0.8   |      |    |
| LOS                     | F     | F     | A     |       | F     |      |       | F     |      | E     | A     |      |    |
| Approach Delay          | 149.7 |       |       |       | 130.6 |      |       | 116.8 |      | 26.8  |       |      |    |
| Approach LOS            | F     |       |       |       | F     |      |       | F     |      | C     |       |      |    |
| Queue Length 50th (ft)  | ~457  | ~458  | 0     |       | ~296  |      |       | ~367  |      | 301   | 0     |      |    |
| Queue Length 95th (ft)  | #676  | #677  | 0     |       | #646  |      |       | 394   |      | 395   | 0     |      |    |
| Internal Link Dist (ft) | 1055  |       |       |       | 371   |      |       | 554   |      | 642   |       |      |    |
| Turn Bay Length (ft)    | 340   |       | 75    |       |       |      |       |       |      |       |       |      |    |
| Base Capacity (vph)     | 326   | 331   | 379   |       | 265   |      |       | 424   |      | 460   | 1599  |      |    |
| Starvation Cap Reductn  | 0     | 0     | 0     |       | 0     |      |       | 0     |      | 0     | 0     |      |    |
| Spillback Cap Reductn   | 0     | 0     | 0     |       | 0     |      |       | 0     |      | 0     | 0     |      |    |
| Storage Cap Reductn     | 0     | 0     | 0     |       | 0     |      |       | 0     |      | 0     | 0     |      |    |
| Reduced v/c Ratio       | 1.19  | 1.18  | 0.11  |       | 1.12  |      |       | 0.85  |      | 0.72  | 0.42  |      |    |

| Intersection Summary                                          |                        |
|---------------------------------------------------------------|------------------------|
| Area Type:                                                    | Other                  |
| Cycle Length: 144                                             |                        |
| Actuated Cycle Length: 144                                    |                        |
| Offset: 113 (78%), Referenced to phase 6:EBTL, Start of Green |                        |
| Natural Cycle: 145                                            |                        |
| Control Type: Actuated-Coordinated                            |                        |
| Maximum v/c Ratio: 1.19                                       |                        |
| Intersection Signal Delay: 93.0                               | Intersection LOS: F    |
| Intersection Capacity Utilization 87.2%                       | ICU Level of Service E |
| Analysis Period (min) 15                                      |                        |

~ Volume exceeds capacity, queue is theoretically infinite.

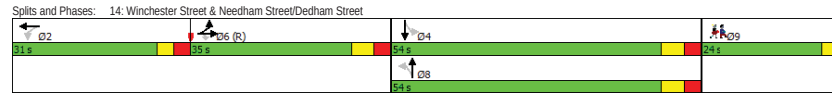
Queue shown is maximum after two cycles.

# 95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

12239.00 :: Needham Street  
14: Winchester Street & Needham Street/Dedham Street

2018 Existing Conditions  
Timing Plan: Weekday Morning



12239.00 :: Needham Street  
15: Winchester Street & Route 9 EB Access Road

2018 Existing Conditions  
Timing Plan: Weekday Morning

| Intersection                                                                                                         |          |        |          |        |       |      |
|----------------------------------------------------------------------------------------------------------------------|----------|--------|----------|--------|-------|------|
| Int Delay, s/veh                                                                                                     | 87.8     |        |          |        |       |      |
| Movement                                                                                                             | WBL      | WBR    | NBT      | NBR    | SBL   | SBT  |
| Lane Configurations                                                                                                  | W        | R      | T        | R      | L     | T    |
| Traffic Vol, veh/h                                                                                                   | 30       | 275    | 910      | 180    | 65    | 970  |
| Future Vol, veh/h                                                                                                    | 30       | 275    | 910      | 180    | 65    | 970  |
| Conflicting Peds, #/hr                                                                                               | 0        | 0      | 0        | 9      | 9     | 0    |
| Sign Control                                                                                                         | Stop     | Stop   | Free     | Free   | Free  | Free |
| RT Channelized                                                                                                       | -        | None   | -        | None   | -     | None |
| Storage Length                                                                                                       | 0        | -      | -        | -      | -     | -    |
| Veh in Median Storage, #                                                                                             | 0        | -      | 0        | -      | -     | 0    |
| Grade, %                                                                                                             | 0        | -      | 0        | -      | -     | 0    |
| Peak Hour Factor                                                                                                     | 91       | 91     | 86       | 86     | 96    | 96   |
| Heavy Vehicles, %                                                                                                    | 1        | 1      | 1        | 1      | 1     | 1    |
| Mvmt Flow                                                                                                            | 33       | 302    | 1058     | 209    | 68    | 1010 |
| Major/Minor                                                                                                          |          |        |          |        |       |      |
|                                                                                                                      | Minor1   | Major1 |          | Major2 |       |      |
| Conflicting Flow All                                                                                                 | 2318     | 1172   | 0        | 0      | 1276  | 0    |
| Stage 1                                                                                                              | 1172     | -      | -        | -      | -     | -    |
| Stage 2                                                                                                              | 1146     | -      | -        | -      | -     | -    |
| Critical Hdwy                                                                                                        | 6.41     | 6.21   | -        | -      | 4.11  | -    |
| Critical Hdwy Stg 1                                                                                                  | 5.41     | -      | -        | -      | -     | -    |
| Critical Hdwy Stg 2                                                                                                  | 5.41     | -      | -        | -      | -     | -    |
| Follow-up Hdwy                                                                                                       | 3.509    | 3.309  | -        | -      | 2.209 | -    |
| Pot Cap-1 Maneuver                                                                                                   | 42       | ~ 235  | -        | -      | 548   | -    |
| Stage 1                                                                                                              | 296      | -      | -        | -      | -     | -    |
| Stage 2                                                                                                              | 304      | -      | -        | -      | -     | -    |
| Platoon blocked, %                                                                                                   | -        | -      | -        | -      | -     | -    |
| Mov Cap-1 Maneuver                                                                                                   | ~ 30     | ~ 233  | -        | -      | 548   | -    |
| Mov Cap-2 Maneuver                                                                                                   | ~ 30     | -      | -        | -      | -     | -    |
| Stage 1                                                                                                              | 294      | -      | -        | -      | -     | -    |
| Stage 2                                                                                                              | 218      | -      | -        | -      | -     | -    |
| Approach                                                                                                             |          |        |          |        |       |      |
|                                                                                                                      | WB       |        | NB       |        | SB    |      |
| HCM Control Delay, s                                                                                                 | \$ 699.5 |        | 0        |        | 0.8   |      |
| HCM LOS                                                                                                              | F        |        |          |        |       |      |
| Minor Lane/Major Mvmt                                                                                                |          |        |          |        |       |      |
|                                                                                                                      | NBT      | NBR    | WBLn1    | SBL    | SBT   |      |
| Capacity (veh/h)                                                                                                     | -        | -      | 140      | 548    | -     |      |
| HCM Lane V/C Ratio                                                                                                   | -        | -      | 2.394    | 0.124  | -     |      |
| HCM Control Delay (s)                                                                                                | -        | -      | \$ 699.5 | 12.5   | 0     |      |
| HCM Lane LOS                                                                                                         | -        | -      | F        | B      | A     |      |
| HCM 95th %ile Q(veh)                                                                                                 | -        | -      | 28.8     | 0.4    | -     |      |
| Notes                                                                                                                |          |        |          |        |       |      |
| ~: Volume exceeds capacity    \$: Delay exceeds 300s    +: Computation Not Defined    *: All major volume in platoon |          |        |          |        |       |      |

12239.00 :: Needham Street  
16: Winchester Street/Centre Street & Route 9 WB Access Road

2018 Existing Conditions  
Timing Plan: Weekday Morning

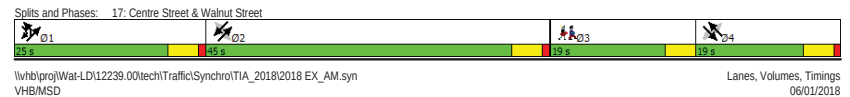
| Intersection                                                                                                        |        |      |       |           |       |       |        |      |      |        |      |      |
|---------------------------------------------------------------------------------------------------------------------|--------|------|-------|-----------|-------|-------|--------|------|------|--------|------|------|
| Int Delay, s/veh                                                                                                    | 347.9  |      |       |           |       |       |        |      |      |        |      |      |
| Movement                                                                                                            | EBL    | EBT  | EBR   | WBL       | WBT   | WBR   | NBL    | NBT  | NBR  | SBL    | SBT  | SBR  |
| Lane Configurations                                                                                                 |        |      |       |           |       |       |        |      |      |        |      |      |
| Traffic Vol, veh/h                                                                                                  | 0      | 0    | 40    | 130       | 5     | 15    | 215    | 970  | 0    | 0      | 865  | 105  |
| Future Vol, veh/h                                                                                                   | 0      | 0    | 40    | 130       | 5     | 15    | 215    | 970  | 0    | 0      | 865  | 105  |
| Conflicting Peds, #/hr                                                                                              | 0      | 0    | 0     | 0         | 0     | 0     | 18     | 0    | 9    | 9      | 0    | 18   |
| Sign Control                                                                                                        | Stop   | Stop | Stop  | Stop      | Stop  | Stop  | Free   | Free | Free | Free   | Free | Free |
| RT Channelized                                                                                                      | -      | -    | None  | -         | -     | None  | -      | -    | None | -      | -    | Free |
| Storage Length                                                                                                      | -      | -    | -     | -         | -     | 50    | 0      | -    | -    | -      | -    | -    |
| Veh in Median Storage, #                                                                                            | -      | 0    | -     | -         | 0     | -     | -      | 0    | -    | -      | 0    | -    |
| Grade, %                                                                                                            | -      | 0    | -     | -         | 0     | -     | -      | 0    | -    | -      | 0    | -    |
| Peak Hour Factor                                                                                                    | 60     | 60   | 60    | 91        | 91    | 91    | 89     | 89   | 89   | 97     | 97   | 97   |
| Heavy Vehicles, %                                                                                                   | 0      | 0    | 0     | 1         | 1     | 1     | 1      | 1    | 1    | 1      | 1    | 1    |
| Mvmt Flow                                                                                                           | 0      | 0    | 67    | 143       | 5     | 16    | 242    | 1090 | 0    | 0      | 892  | 108  |
| Major/Minor                                                                                                         | Minor2 |      |       | Minor1    |       |       | Major1 |      |      | Major2 |      |      |
| Conflicting Flow All                                                                                                | 2486   | 2483 | 910   | 2498      | 2483  | 1090  | 910    | 0    | -    | -      | -    | 0    |
| Stage 1                                                                                                             | 910    | 910  | -     | 1573      | 1573  | -     | -      | -    | -    | -      | -    | -    |
| Stage 2                                                                                                             | 1576   | 1573 | -     | 925       | 910   | -     | -      | -    | -    | -      | -    | -    |
| Critical Hdwy                                                                                                       | 7.1    | 6.5  | 6.2   | 7.11      | 6.51  | 6.21  | 4.11   | -    | -    | -      | -    | -    |
| Critical Hdwy Stp 1                                                                                                 | 6.1    | 5.5  | -     | 6.11      | 5.51  | -     | -      | -    | -    | -      | -    | -    |
| Critical Hdwy Stp 2                                                                                                 | 6.1    | 5.5  | -     | 6.11      | 5.51  | -     | -      | -    | -    | -      | -    | -    |
| Follow-up Hdwy                                                                                                      | 3.5    | 4    | 3.3   | 3.509     | 4.009 | 3.309 | 2.209  | -    | -    | -      | -    | -    |
| Pot Cap-1 Maneuver                                                                                                  | 20     | 30   | 336   | ~ 20      | 30    | 263   | 753    | -    | 0    | 0      | -    | 0    |
| Stage 1                                                                                                             | 332    | 356  | -     | ~ 139     | 171   | -     | -      | -    | 0    | 0      | -    | 0    |
| Stage 2                                                                                                             | 139    | 172  | -     | 324       | 355   | -     | -      | -    | 0    | 0      | -    | 0    |
| Platoon blocked, %                                                                                                  | -      | -    | -     | -         | -     | -     | -      | -    | -    | -      | -    | -    |
| Mov Cap-1 Maneuver                                                                                                  | 11     | 20   | 331   | ~ 12      | 20    | 263   | 753    | -    | -    | -      | -    | -    |
| Mov Cap-2 Maneuver                                                                                                  | 11     | 20   | -     | ~ 12      | 20    | -     | -      | -    | -    | -      | -    | -    |
| Stage 1                                                                                                             | 222    | 351  | -     | ~ 94      | 116   | -     | -      | -    | -    | -      | -    | -    |
| Stage 2                                                                                                             | 84     | 117  | -     | 259       | 350   | -     | -      | -    | -    | -      | -    | -    |
| Approach                                                                                                            | EB     |      |       | WB        |       |       | NB     |      |      | SB     |      |      |
| HCM Control Delay, s                                                                                                | 18.6   |      |       | \$ 5155.5 |       |       | 2.2    |      |      | 0      |      |      |
| HCM LOS                                                                                                             | C      |      |       | F         |       |       |        |      |      |        |      |      |
| Minor Lane/Major Mvmt                                                                                               | NBL    | NBT  | EBLn1 | WBLn1     | WBLn2 | SBT   |        |      |      |        |      |      |
| Capacity (veh/h)                                                                                                    | 753    | -    | 331   | 12        | 263   | -     |        |      |      |        |      |      |
| HCM Lane V/C Ratio                                                                                                  | 0.321  | -    | 0.201 | 12.363    | 0.063 | -     |        |      |      |        |      |      |
| HCM Control Delay (s)                                                                                               | 12     | -    | 18.6  | \$ 5726.1 | 19.6  | -     |        |      |      |        |      |      |
| HCM Lane LOS                                                                                                        | B      | -    | C     | F         | C     | -     |        |      |      |        |      |      |
| HCM 95th %tile Q(veh)                                                                                               | 1.4    | -    | 0.7   | 19.8      | 0.2   | -     |        |      |      |        |      |      |
| Notes                                                                                                               |        |      |       |           |       |       |        |      |      |        |      |      |
| ~: Volume exceeds capacity    \$ Delay exceeds 300s    +: Computation Not Defined    *: All major volume in platoon |        |      |       |           |       |       |        |      |      |        |      |      |

12239.00 :: Needham Street  
17: Centre Street & Walnut Street

2018 Existing Conditions  
Timing Plan: Weekday Morning

| Lane Group              | SEL   | SET   | SER   | NWL   | NWT   | NWR   | NEL   | NET   | NER   | SWL   | SWT   | SWR  | Ø3 |
|-------------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|------|----|
| Lane Configurations     |       |       |       |       |       |       |       |       |       |       |       |      |    |
| Traffic Volume (vph)    | 20    | 1     | 330   | 35    | 40    | 0     | 355   | 630   | 2     | 1     | 605   | 30   |    |
| Future Volume (vph)     | 20    | 1     | 330   | 35    | 40    | 0     | 355   | 630   | 2     | 1     | 605   | 30   |    |
| Ideal Flow (vphpl)      | 1900  | 1900  | 1900  | 1900  | 1900  | 1900  | 1900  | 1900  | 1900  | 1900  | 1900  | 1900 |    |
| Storage Length (ft)     | 0     | 0     | 50    | 0     | 0     | 0     | 75    | 0     | 0     | 0     | 0     | 0    |    |
| Storage Lanes           | 0     | 0     | 1     | 0     | 0     | 0     | 1     | 0     | 0     | 0     | 0     | 0    |    |
| Taper Length (ft)       | 25    | 0     | 0     | 25    | 0     | 0     | 25    | 0     | 0     | 25    | 0     | 0    |    |
| Satd. Flow (prot)       | 0     | 1813  | 1615  | 0     | 1856  | 0     | 1770  | 1863  | 0     | 0     | 1886  | 0    |    |
| Flt Permitted           | 0.746 | 0     | 0     | 0.841 | 0     | 0.258 | 0     | 0.999 | 0     | 0     | 0.999 | 0    |    |
| Satd. Flow (perm)       | 0     | 1349  | 1573  | 0     | 1587  | 0     | 480   | 1863  | 0     | 0     | 1885  | 0    |    |
| Right Turn on Red       | No    |       |       |       |       |       |       |       |       |       |       |      |    |
| Satd. Flow (RTOR)       | No    |       |       |       |       |       |       |       |       |       |       |      |    |
| Link Speed (mph)        | 30    | 30    | 30    | 30    | 30    | 30    | 30    | 30    | 30    | 30    | 30    | 30   |    |
| Link Distance (ft)      | 624   | 387   | 508   | 531   | 531   | 531   | 531   | 531   | 531   | 531   | 531   | 531  |    |
| Travel Time (s)         | 14.2  | 8.8   | 11.5  | 12.1  | 12.1  | 12.1  | 12.1  | 12.1  | 12.1  | 12.1  | 12.1  | 12.1 |    |
| Confl. Peds. (#/hr)     | 17    | 4     | 4     | 17    | 3     | 9     | 9     | 9     | 9     | 9     | 9     | 9    |    |
| Peak Hour Factor        | 0.97  | 0.97  | 0.97  | 0.89  | 0.89  | 0.89  | 0.96  | 0.96  | 0.96  | 0.96  | 0.96  | 0.96 |    |
| Heavy Vehicles (%)      | 0%    | 0%    | 0%    | 0%    | 0%    | 0%    | 2%    | 2%    | 2%    | 2%    | 2%    | 2%   |    |
| Shared Lane Traffic (%) |       |       |       |       |       |       |       |       |       |       |       |      |    |
| Lane Group Flow (vph)   | 0     | 22    | 340   | 0     | 84    | 0     | 370   | 658   | 0     | 0     | 649   | 0    |    |
| Turn Type               | Perm  | NA    | pm+ov | Perm  | NA    | D.P+P | NA    | Perm  | NA    | Perm  | NA    | Perm |    |
| Protected Phases        | 4     | 4     | 1     | 4     | 4     | 1     | 12    | 2     | 2     | 2     | 2     | 3    |    |
| Permitted Phases        | 4     | 4     | 1     | 4     | 4     | 1     | 12    | 2     | 2     | 2     | 2     | 3    |    |
| Detector Phase          | 4     | 4     | 1     | 4     | 4     | 1     | 12    | 2     | 2     | 2     | 2     | 3    |    |
| Switch Phase            |       |       |       |       |       |       |       |       |       |       |       |      |    |
| Minimum Initial (s)     | 9.0   | 9.0   | 7.0   | 9.0   | 9.0   | 7.0   | 7.0   | 6.0   | 6.0   | 6.0   | 6.0   | 4.0  |    |
| Minimum Split (s)       | 14.0  | 14.0  | 12.0  | 14.0  | 14.0  | 12.0  | 12.0  | 11.0  | 11.0  | 11.0  | 11.0  | 19.0 |    |
| Total Split (s)         | 19.0  | 19.0  | 25.0  | 19.0  | 19.0  | 25.0  | 25.0  | 45.0  | 45.0  | 45.0  | 45.0  | 19.0 |    |
| Total Split (%)         | 17.6% | 17.6% | 23.1% | 17.6% | 17.6% | 23.1% | 23.1% | 41.7% | 41.7% | 41.7% | 41.7% | 18%  |    |
| Yellow Time (s)         | 4.0   | 4.0   | 4.0   | 4.0   | 4.0   | 4.0   | 4.0   | 4.0   | 4.0   | 4.0   | 4.0   | 4.0  |    |
| All-Red Time (s)        | 1.0   | 1.0   | 1.0   | 1.0   | 1.0   | 1.0   | 1.0   | 1.0   | 1.0   | 1.0   | 1.0   | 1.0  |    |
| Last Time Adjust (s)    | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0  |    |
| Total Lost Time (s)     | 5.0   | 5.0   | 5.0   | 5.0   | 5.0   | 5.0   | 5.0   | 5.0   | 5.0   | 5.0   | 5.0   | 5.0  |    |
| Lead/Lag                | Lag   | Lag   | Lead  | Lag   | Lag   | Lead  | Lead  | Lag   | Lag   | Lead  | Lead  | Lead |    |
| Lead-Lag Optimize?      |       |       |       |       |       |       |       |       |       |       |       |      |    |
| Recall Mode             | Min   | Min   | Max   | Min   | Min   | Max   | Max   | Max   | Max   | Max   | Max   | None |    |
| Act Effct Green (s)     | 10.7  | 30.9  | 10.7  | 60.8  | 65.8  | 40.5  | 40.5  | 40.5  | 40.5  | 40.5  | 40.5  | 40.5 |    |
| Actuated g/C Ratio      | 0.11  | 0.32  | 0.11  | 0.63  | 0.68  | 0.42  | 0.42  | 0.42  | 0.42  | 0.42  | 0.42  | 0.42 |    |
| v/c Ratio               | 0.15  | 0.67  | 0.48  | 0.65  | 0.52  | 0.82  | 0.82  | 0.82  | 0.82  | 0.82  | 0.82  | 0.82 |    |
| Control Delay           | 44.5  | 35.5  | 52.8  | 16.4  | 11.8  | 37.8  | 37.8  | 37.8  | 37.8  | 37.8  | 37.8  | 37.8 |    |
| Queue Delay             | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0  |    |
| Total Delay             | 44.5  | 35.5  | 52.8  | 16.4  | 11.8  | 37.8  | 37.8  | 37.8  | 37.8  | 37.8  | 37.8  | 37.8 |    |
| LOS                     | D     | D     | D     | B     | B     | D     | D     | D     | D     | D     | D     | D    |    |
| Approach Delay          | 36.0  | 0     | 52.8  | 13.4  | 0     | 37.8  | 37.8  | 37.8  | 37.8  | 37.8  | 37.8  | 37.8 |    |
| Approach LOS            | D     | D     | D     | B     | D     | D     | D     | D     | D     | D     | D     | D    |    |
| Queue Length 50th (ft)  | 14    | 189   | 54    | 107   | 232   | 396   | 396   | 396   | 396   | 396   | 396   | 396  |    |
| Queue Length 95th (ft)  | 38    | 285   | 103   | 209   | 370   | #655  | #655  | #655  | #655  | #655  | #655  | #655 |    |
| Internal Link Dist (ft) | 544   | 307   | 428   | 451   | 451   | 451   | 451   | 451   | 451   | 451   | 451   | 451  |    |
| Turn Bay Length (ft)    | 50    | 75    | 75    | 75    | 75    | 75    | 75    | 75    | 75    | 75    | 75    | 75   |    |
| Base Capacity (vph)     | 196   | 509   | 231   | 569   | 1263  | 788   | 788   | 788   | 788   | 788   | 788   | 788  |    |
| Starvation Cap Reductn  | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0    |    |
| Spillback Cap Reductn   | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0    |    |
| Storage Cap Reductn     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0    |    |
| Reduced v/c Ratio       | 0.11  | 0.67  | 0.36  | 0.65  | 0.52  | 0.82  | 0.82  | 0.82  | 0.82  | 0.82  | 0.82  | 0.82 |    |

| Intersection Summary                                            |                  |  |  |  |  |  |  |  |  |  |  |  |
|-----------------------------------------------------------------|------------------|--|--|--|--|--|--|--|--|--|--|--|
| Area Type:                                                      | Other            |  |  |  |  |  |  |  |  |  |  |  |
| Cycle Length:                                                   | 108              |  |  |  |  |  |  |  |  |  |  |  |
| Actuated Cycle Length:                                          | 97.1             |  |  |  |  |  |  |  |  |  |  |  |
| Natural Cycle:                                                  | 90               |  |  |  |  |  |  |  |  |  |  |  |
| Control Type:                                                   | Semi Act-Uncoord |  |  |  |  |  |  |  |  |  |  |  |
| Maximum v/c Ratio:                                              | 0.82             |  |  |  |  |  |  |  |  |  |  |  |
| Intersection Signal Delay:                                      | 26.3             |  |  |  |  |  |  |  |  |  |  |  |
| Intersection Capacity Utilization:                              | 90.2%            |  |  |  |  |  |  |  |  |  |  |  |
| ICU Level of Service:                                           | E                |  |  |  |  |  |  |  |  |  |  |  |
| Analysis Period (min):                                          | 15               |  |  |  |  |  |  |  |  |  |  |  |
| # 95th percentile volume exceeds capacity, queue may be longer. |                  |  |  |  |  |  |  |  |  |  |  |  |
| Queue shown is maximum after two cycles.                        |                  |  |  |  |  |  |  |  |  |  |  |  |



12239.00 :: Needham Street  
18: Nahanton Street & Winchester Street

2018 Existing Conditions  
Timing Plan: Weekday Morning

| Lane Group              | EBL                                                                               | EBT                                                                               | WBT                                                                               | WBR                                                                               | SBL                                                                               | SBR                                                                               |
|-------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|
| Lane Configurations     |  |  |  |  |  |  |
| Traffic Volume (vph)    | 240                                                                               | 495                                                                               | 615                                                                               | 10                                                                                | 20                                                                                | 270                                                                               |
| Future Volume (vph)     | 240                                                                               | 495                                                                               | 615                                                                               | 10                                                                                | 20                                                                                | 270                                                                               |
| Ideal Flow (vphpl)      | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                              |
| Storage Length (ft)     | 175                                                                               |                                                                                   |                                                                                   |                                                                                   | 75                                                                                | 0                                                                                 |
| Storage Lanes           | 1                                                                                 |                                                                                   |                                                                                   |                                                                                   | 1                                                                                 |                                                                                   |
| Taper Length (ft)       | 25                                                                                |                                                                                   |                                                                                   |                                                                                   | 25                                                                                |                                                                                   |
| Satd. Flow (prot)       | 1787                                                                              | 1881                                                                              | 1877                                                                              | 0                                                                                 | 1787                                                                              | 1599                                                                              |
| Flt Permitted           | 0.260                                                                             |                                                                                   |                                                                                   |                                                                                   | 0.950                                                                             |                                                                                   |
| Satd. Flow (perm)       | 489                                                                               | 1881                                                                              | 1877                                                                              | 0                                                                                 | 1787                                                                              | 1599                                                                              |
| Right Turn on Red       |                                                                                   |                                                                                   | Yes                                                                               |                                                                                   | No                                                                                |                                                                                   |
| Satd. Flow (RTOR)       |                                                                                   |                                                                                   | 1                                                                                 |                                                                                   |                                                                                   |                                                                                   |
| Link Speed (mph)        | 30                                                                                | 30                                                                                |                                                                                   |                                                                                   | 30                                                                                |                                                                                   |
| Link Distance (ft)      | 963                                                                               | 734                                                                               |                                                                                   |                                                                                   | 889                                                                               |                                                                                   |
| Travel Time (s)         |                                                                                   | 21.9                                                                              | 16.7                                                                              |                                                                                   | 20.2                                                                              |                                                                                   |
| Peak Hour Factor        | 0.94                                                                              | 0.94                                                                              | 0.93                                                                              | 0.93                                                                              | 0.91                                                                              | 0.91                                                                              |
| Heavy Vehicles (%)      | 1%                                                                                | 1%                                                                                | 1%                                                                                | 1%                                                                                | 1%                                                                                | 1%                                                                                |
| Shared Lane Traffic (%) |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| Lane Group Flow (vph)   | 255                                                                               | 527                                                                               | 672                                                                               | 0                                                                                 | 22                                                                                | 297                                                                               |
| Turn Type               | pm+pt                                                                             | NA                                                                                | NA                                                                                |                                                                                   | Prot                                                                              | pt+ov                                                                             |
| Protected Phases        | 5                                                                                 | 2                                                                                 | 6                                                                                 |                                                                                   | 8                                                                                 | 5/8                                                                               |
| Permitted Phases        | 2                                                                                 |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| Detector Phase          | 5                                                                                 | 2                                                                                 | 6                                                                                 |                                                                                   | 8                                                                                 | 5/8                                                                               |
| Switch Phase            |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| Minimum Initial (s)     | 6.0                                                                               | 10.0                                                                              | 10.0                                                                              |                                                                                   | 6.0                                                                               |                                                                                   |
| Minimum Split (s)       | 11.0                                                                              | 15.0                                                                              | 23.0                                                                              |                                                                                   | 10.0                                                                              |                                                                                   |
| Total Split (s)         | 29.0                                                                              | 100.0                                                                             | 71.0                                                                              |                                                                                   | 15.0                                                                              |                                                                                   |
| Total Split (%)         | 25.2%                                                                             | 87.0%                                                                             | 61.7%                                                                             |                                                                                   | 13.0%                                                                             |                                                                                   |
| Yellow Time (s)         | 3.0                                                                               | 3.0                                                                               | 3.0                                                                               |                                                                                   | 3.0                                                                               |                                                                                   |
| All-Red Time (s)        | 2.0                                                                               | 2.0                                                                               | 2.0                                                                               |                                                                                   | 1.0                                                                               |                                                                                   |
| Lost Time Adjust (s)    | 0.0                                                                               | 0.0                                                                               | 0.0                                                                               |                                                                                   | 0.0                                                                               |                                                                                   |
| Total Lost Time (s)     | 5.0                                                                               | 5.0                                                                               | 5.0                                                                               |                                                                                   | 4.0                                                                               |                                                                                   |
| Lead/Lag                | Lead                                                                              |                                                                                   | Lag                                                                               |                                                                                   |                                                                                   |                                                                                   |
| Lead-Lag Optimize?      | Yes                                                                               |                                                                                   | Yes                                                                               |                                                                                   |                                                                                   |                                                                                   |
| Recall Mode             | None                                                                              | C-Min                                                                             | None                                                                              |                                                                                   | None                                                                              |                                                                                   |
| Act Effct Green (s)     | 87.0                                                                              | 87.0                                                                              | 69.5                                                                              |                                                                                   | 19.0                                                                              | 35.5                                                                              |
| Actuated g/C Ratio      | 0.76                                                                              | 0.76                                                                              | 0.60                                                                              |                                                                                   | 0.17                                                                              | 0.31                                                                              |
| v/c Ratio               | 0.50                                                                              | 0.37                                                                              | 0.59                                                                              |                                                                                   | 0.07                                                                              | 0.60                                                                              |
| Control Delay           | 7.6                                                                               | 5.7                                                                               | 17.8                                                                              |                                                                                   | 42.0                                                                              | 38.5                                                                              |
| Queue Delay             | 0.0                                                                               | 0.0                                                                               | 0.0                                                                               |                                                                                   | 0.0                                                                               | 0.0                                                                               |
| Total Delay             | 7.6                                                                               | 5.7                                                                               | 17.8                                                                              |                                                                                   | 42.0                                                                              | 38.5                                                                              |
| LOS                     | A                                                                                 | A                                                                                 | B                                                                                 |                                                                                   | D                                                                                 | D                                                                                 |
| Approach Delay          | 6.3                                                                               | 17.8                                                                              |                                                                                   |                                                                                   | 38.7                                                                              |                                                                                   |
| Approach LOS            | A                                                                                 | B                                                                                 |                                                                                   |                                                                                   | D                                                                                 |                                                                                   |
| Queue Length 50th (ft)  | 52                                                                                | 127                                                                               | 295                                                                               |                                                                                   | 13                                                                                | 183                                                                               |
| Queue Length 95th (ft)  | 51                                                                                | 116                                                                               | 450                                                                               |                                                                                   | 41                                                                                | 262                                                                               |
| Internal Link Dist (ft) |                                                                                   | 883                                                                               | 654                                                                               |                                                                                   | 809                                                                               |                                                                                   |
| Turn Bay Length (ft)    | 175                                                                               |                                                                                   |                                                                                   |                                                                                   | 75                                                                                |                                                                                   |
| Base Capacity (vph)     | 641                                                                               | 1553                                                                              | 1145                                                                              |                                                                                   | 294                                                                               | 653                                                                               |
| Starvation Cap Reductn  | 0                                                                                 | 0                                                                                 | 0                                                                                 |                                                                                   | 0                                                                                 | 0                                                                                 |
| Spillback Cap Reductn   | 0                                                                                 | 0                                                                                 | 0                                                                                 |                                                                                   | 0                                                                                 | 0                                                                                 |
| Storage Cap Reductn     | 0                                                                                 | 0                                                                                 | 0                                                                                 |                                                                                   | 0                                                                                 | 0                                                                                 |
| Reduced v/c Ratio       | 0.40                                                                              | 0.34                                                                              | 0.59                                                                              |                                                                                   | 0.07                                                                              | 0.45                                                                              |

| Intersection Summary                                       |                        |
|------------------------------------------------------------|------------------------|
| Area Type:                                                 | Other                  |
| Cycle Length: 115                                          |                        |
| Actuated Cycle Length: 115                                 |                        |
| Offset: 8 (7%), Referenced to phase 2:EBTL, Start of Green |                        |
| Natural Cycle: 55                                          |                        |
| Control Type: Actuated-Coordinated                         |                        |
| Maximum v/c Ratio: 0.60                                    |                        |
| Intersection Signal Delay: 16.5                            | Intersection LOS: B    |
| Intersection Capacity Utilization 62.9%                    | ICU Level of Service B |
| Analysis Period (min) 15                                   |                        |

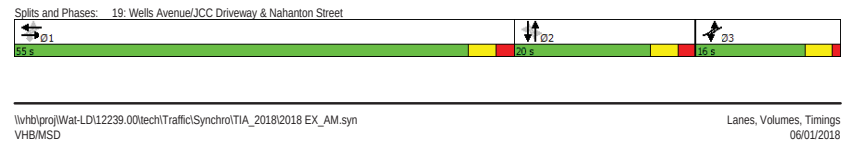


12239.00 :: Needham Street  
19: Wells Avenue/JCC Driveway & Nahanton Street

2018 Existing Conditions  
Timing Plan: Weekday Morning

| Lane Group              | EBL                                                                                 | EBT                                                                                 | EBR                                                                                 | WBL                                                                                 | WBT                                                                                 | WBR                                                                                 | NBL                                                                                 | NBT                                                                                 | NBR                                                                                 | SBL                                                                                 | SBT                                                                                 | SBR                                                                                 |
|-------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
| Lane Configurations     |  |  |  |  |  |  |  |  |  |  |  |  |
| Traffic Volume (vph)    | 65                                                                                  | 545                                                                                 | 260                                                                                 | 250                                                                                 | 475                                                                                 | 160                                                                                 | 90                                                                                  | 15                                                                                  | 125                                                                                 | 65                                                                                  | 10                                                                                  | 50                                                                                  |
| Future Volume (vph)     | 65                                                                                  | 545                                                                                 | 260                                                                                 | 250                                                                                 | 475                                                                                 | 160                                                                                 | 90                                                                                  | 15                                                                                  | 125                                                                                 | 65                                                                                  | 10                                                                                  | 50                                                                                  |
| Ideal Flow (vphpl)      | 1900                                                                                | 1900                                                                                | 1900                                                                                | 1900                                                                                | 1900                                                                                | 1900                                                                                | 1900                                                                                | 1900                                                                                | 1900                                                                                | 1900                                                                                | 1900                                                                                | 1900                                                                                |
| Storage Length (ft)     | 125                                                                                 |                                                                                     | 125                                                                                 | 150                                                                                 |                                                                                     | 0                                                                                   | 0                                                                                   | 0                                                                                   | 0                                                                                   | 75                                                                                  | 0                                                                                   | 0                                                                                   |
| Storage Lanes           | 1                                                                                   |                                                                                     | 1                                                                                   |                                                                                     |                                                                                     | 0                                                                                   | 1                                                                                   |                                                                                     |                                                                                     | 0                                                                                   | 1                                                                                   | 0                                                                                   |
| Taper Length (ft)       | 25                                                                                  |                                                                                     | 25                                                                                  |                                                                                     |                                                                                     | 25                                                                                  |                                                                                     |                                                                                     |                                                                                     | 25                                                                                  |                                                                                     |                                                                                     |
| Satd. Flow (prot)       | 1787                                                                                | 1881                                                                                | 1599                                                                                | 1805                                                                                | 1828                                                                                | 0                                                                                   | 1787                                                                                | 1629                                                                                | 0                                                                                   | 1805                                                                                | 1661                                                                                | 0                                                                                   |
| Flt Permitted           | 0.238                                                                               |                                                                                     |                                                                                     | 0.326                                                                               |                                                                                     |                                                                                     | 0.713                                                                               |                                                                                     |                                                                                     | 0.621                                                                               |                                                                                     |                                                                                     |
| Satd. Flow (perm)       | 448                                                                                 | 1881                                                                                | 1599                                                                                | 619                                                                                 | 1828                                                                                | 0                                                                                   | 1341                                                                                | 1629                                                                                | 0                                                                                   | 1180                                                                                | 1661                                                                                | 0                                                                                   |
| Right Turn on Red       |                                                                                     | Yes                                                                                 |                                                                                     |                                                                                     | Yes                                                                                 |                                                                                     |                                                                                     | Yes                                                                                 |                                                                                     |                                                                                     | Yes                                                                                 |                                                                                     |
| Satd. Flow (RTOR)       |                                                                                     | 251                                                                                 |                                                                                     |                                                                                     | 30                                                                                  |                                                                                     |                                                                                     | 140                                                                                 |                                                                                     |                                                                                     | 57                                                                                  |                                                                                     |
| Link Speed (mph)        |                                                                                     | 30                                                                                  |                                                                                     |                                                                                     | 30                                                                                  |                                                                                     |                                                                                     | 30                                                                                  |                                                                                     |                                                                                     | 30                                                                                  |                                                                                     |
| Link Distance (ft)      |                                                                                     | 797                                                                                 |                                                                                     |                                                                                     | 963                                                                                 |                                                                                     |                                                                                     | 598                                                                                 |                                                                                     |                                                                                     | 628                                                                                 |                                                                                     |
| Travel Time (s)         |                                                                                     | 18.1                                                                                |                                                                                     |                                                                                     | 21.9                                                                                |                                                                                     |                                                                                     | 13.6                                                                                |                                                                                     |                                                                                     | 14.3                                                                                |                                                                                     |
| Peak Hour Factor        | 0.96                                                                                | 0.96                                                                                | 0.96                                                                                | 0.93                                                                                | 0.93                                                                                | 0.89                                                                                | 0.89                                                                                | 0.89                                                                                | 0.89                                                                                | 0.88                                                                                | 0.88                                                                                | 0.88                                                                                |
| Heavy Vehicles (%)      | 1%                                                                                  | 1%                                                                                  | 1%                                                                                  | 0%                                                                                  | 0%                                                                                  | 0%                                                                                  | 1%                                                                                  | 1%                                                                                  | 1%                                                                                  | 0%                                                                                  | 0%                                                                                  | 0%                                                                                  |
| Shared Lane Traffic (%) |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Lane Group Flow (vph)   | 68                                                                                  | 568                                                                                 | 271                                                                                 | 269                                                                                 | 683                                                                                 | 0                                                                                   | 101                                                                                 | 157                                                                                 | 0                                                                                   | 74                                                                                  | 68                                                                                  | 0                                                                                   |
| Turn Type               | pm+pt                                                                               | NA                                                                                  | Perm                                                                                | pm+pt                                                                               | NA                                                                                  |                                                                                     | Perm                                                                                | NA                                                                                  |                                                                                     | Perm                                                                                | NA                                                                                  |                                                                                     |
| Protected Phases        | 3                                                                                   | 1                                                                                   |                                                                                     | 3                                                                                   | 1                                                                                   |                                                                                     | 2                                                                                   |                                                                                     |                                                                                     | 2                                                                                   |                                                                                     |                                                                                     |
| Permitted Phases        | 1                                                                                   |                                                                                     | 1                                                                                   | 1                                                                                   |                                                                                     |                                                                                     | 2                                                                                   |                                                                                     |                                                                                     | 2                                                                                   |                                                                                     |                                                                                     |
| Detector Phase          | 3                                                                                   | 1                                                                                   |                                                                                     | 3                                                                                   | 1                                                                                   |                                                                                     | 2                                                                                   |                                                                                     |                                                                                     | 2                                                                                   |                                                                                     |                                                                                     |
| Switch Phase            |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Minimum Initial (s)     | 6.0                                                                                 | 6.0                                                                                 | 6.0                                                                                 | 6.0                                                                                 | 6.0                                                                                 |                                                                                     | 6.0                                                                                 | 6.0                                                                                 |                                                                                     | 6.0                                                                                 | 6.0                                                                                 |                                                                                     |
| Minimum Split (s)       | 10.0                                                                                | 11.0                                                                                | 11.0                                                                                | 10.0                                                                                | 11.0                                                                                |                                                                                     | 11.0                                                                                | 11.0                                                                                |                                                                                     | 11.0                                                                                | 11.0                                                                                |                                                                                     |
| Total Split (s)         | 16.0                                                                                | 55.0                                                                                | 55.0                                                                                | 16.0                                                                                | 55.0                                                                                |                                                                                     | 20.0                                                                                | 20.0                                                                                |                                                                                     | 20.0                                                                                | 20.0                                                                                |                                                                                     |
| Total Split (%)         | 17.6%                                                                               | 60.4%                                                                               | 60.4%                                                                               | 17.6%                                                                               | 60.4%                                                                               |                                                                                     | 22.0%                                                                               | 22.0%                                                                               |                                                                                     | 22.0%                                                                               | 22.0%                                                                               |                                                                                     |
| Yellow Time (s)         | 3.0                                                                                 | 3.0                                                                                 | 3.0                                                                                 | 3.0                                                                                 | 3.0                                                                                 |                                                                                     | 3.0                                                                                 | 3.0                                                                                 |                                                                                     | 3.0                                                                                 | 3.0                                                                                 |                                                                                     |
| All-Red Time (s)        | 1.0                                                                                 | 2.0                                                                                 | 2.0                                                                                 | 1.0                                                                                 | 2.0                                                                                 |                                                                                     | 2.0                                                                                 | 2.0                                                                                 |                                                                                     | 2.0                                                                                 | 2.0                                                                                 |                                                                                     |
| Lost Time Adjust (s)    | 0.0                                                                                 | 0.0                                                                                 | 0.0                                                                                 | 0.0                                                                                 | 0.0                                                                                 |                                                                                     | 0.0                                                                                 | 0.0                                                                                 |                                                                                     | 0.0                                                                                 | 0.0                                                                                 |                                                                                     |
| Total Lost Time (s)     | 4.0                                                                                 | 5.0                                                                                 | 5.0                                                                                 | 4.0                                                                                 | 5.0                                                                                 |                                                                                     | 5.0                                                                                 | 5.0                                                                                 |                                                                                     | 5.0                                                                                 | 5.0                                                                                 |                                                                                     |
| Lead/Lag                | Lead                                                                                |                                                                                     | Lead                                                                                |                                                                                     | Lead                                                                                |                                                                                     | Lag                                                                                 | Lag                                                                                 |                                                                                     | Lag                                                                                 | Lag                                                                                 |                                                                                     |
| Lead-Lag Optimize?      |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Recall Mode             | None                                                                                | None                                                                                | None                                                                                | None                                                                                | None                                                                                |                                                                                     | None                                                                                | None                                                                                |                                                                                     | None                                                                                | None                                                                                |                                                                                     |
| Act Effct Green (s)     | 45.1                                                                                | 35.8                                                                                | 35.8                                                                                | 45.1                                                                                | 35.8                                                                                |                                                                                     | 10.0                                                                                | 10.0                                                                                |                                                                                     | 10.0                                                                                | 10.0                                                                                |                                                                                     |
| Actuated g/C Ratio      | 0.65                                                                                | 0.52                                                                                | 0.52                                                                                | 0.65                                                                                | 0.52                                                                                |                                                                                     | 0.14                                                                                | 0.14                                                                                |                                                                                     | 0.14                                                                                | 0.14                                                                                |                                                                                     |
| v/c Ratio               | 0.15                                                                                | 0.58                                                                                | 0.29                                                                                | 0.49                                                                                | 0.71                                                                                |                                                                                     | 0.52                                                                                | 0.44                                                                                |                                                                                     | 0.43                                                                                | 0.23                                                                                |                                                                                     |
| Control Delay           | 3.9                                                                                 | 14.2                                                                                | 2.5                                                                                 | 6.8                                                                                 | 16.8                                                                                |                                                                                     | 41.7                                                                                | 12.7                                                                                |                                                                                     | 39.7                                                                                | 14.2                                                                                |                                                                                     |
| Queue Delay             | 0.0                                                                                 | 0.0                                                                                 | 0.0                                                                                 | 0.0                                                                                 | 0.0                                                                                 |                                                                                     | 0.0                                                                                 | 0.0                                                                                 |                                                                                     | 0.0                                                                                 | 0.0                                                                                 |                                                                                     |
| Total Delay             | 3.9                                                                                 | 14.2                                                                                | 2.5                                                                                 | 6.8                                                                                 | 16.8                                                                                |                                                                                     | 41.7                                                                                | 12.7                                                                                |                                                                                     | 39.7                                                                                | 14.2                                                                                |                                                                                     |
| LOS                     | A                                                                                   | B                                                                                   | A                                                                                   | A                                                                                   | B                                                                                   |                                                                                     | D                                                                                   | B                                                                                   |                                                                                     | D                                                                                   | B                                                                                   |                                                                                     |
| Approach Delay          | 9.9                                                                                 |                                                                                     |                                                                                     | 14.0                                                                                |                                                                                     |                                                                                     | 24.0                                                                                |                                                                                     |                                                                                     | 27.5                                                                                |                                                                                     |                                                                                     |
| Approach LOS            | A                                                                                   |                                                                                     |                                                                                     | B                                                                                   |                                                                                     |                                                                                     | C                                                                                   |                                                                                     |                                                                                     | C                                                                                   |                                                                                     |                                                                                     |
| Queue Length 50th (ft)  | 6                                                                                   | 145                                                                                 | 4                                                                                   | 28                                                                                  | 183                                                                                 |                                                                                     | 40                                                                                  |                                                                                     |                                                                                     | 29                                                                                  |                                                                                     |                                                                                     |
| Queue Length 95th (ft)  | 19                                                                                  | 287                                                                                 | 39                                                                                  | 63                                                                                  | 371                                                                                 |                                                                                     | 101                                                                                 | 60                                                                                  |                                                                                     | 78                                                                                  | 40                                                                                  |                                                                                     |
| Internal Link Dist (ft) |                                                                                     | 717                                                                                 |                                                                                     | 883                                                                                 |                                                                                     |                                                                                     | 518                                                                                 |                                                                                     |                                                                                     | 548                                                                                 |                                                                                     |                                                                                     |
| Turn Bay Length (ft)    | 125                                                                                 |                                                                                     | 125                                                                                 | 150                                                                                 |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     | 75                                                                                  |                                                                                     |                                                                                     |
| Base Capacity (vph)     | 565                                                                                 | 1415                                                                                | 1264                                                                                | 657                                                                                 | 1382                                                                                |                                                                                     | 312                                                                                 | 486                                                                                 |                                                                                     | 274                                                                                 | 430                                                                                 |                                                                                     |
| Starvation Cap Reductn  | 0                                                                                   | 0                                                                                   | 0                                                                                   | 0                                                                                   | 0                                                                                   |                                                                                     | 0                                                                                   | 0                                                                                   |                                                                                     | 0                                                                                   | 0                                                                                   |                                                                                     |
| Spillback Cap Reductn   | 0                                                                                   | 0                                                                                   | 0                                                                                   | 0                                                                                   | 0                                                                                   |                                                                                     | 0                                                                                   | 0                                                                                   |                                                                                     | 0                                                                                   | 0                                                                                   |                                                                                     |
| Storage Cap Reductn     | 0                                                                                   | 0                                                                                   | 0                                                                                   | 0                                                                                   | 0                                                                                   |                                                                                     | 0                                                                                   | 0                                                                                   |                                                                                     | 0                                                                                   | 0                                                                                   |                                                                                     |
| Reduced v/c Ratio       | 0.12                                                                                | 0.40                                                                                | 0.21                                                                                | 0.41                                                                                | 0.49                                                                                |                                                                                     | 0.32                                                                                | 0.32                                                                                |                                                                                     | 0.27                                                                                | 0.16                                                                                |                                                                                     |

| Intersection Summary                    |                        |
|-----------------------------------------|------------------------|
| Area Type:                              | Other                  |
| Cycle Length: 91                        |                        |
| Actuated Cycle Length: 69.1             |                        |
| Natural Cycle: 60                       |                        |
| Control Type: Actuated-Uncoordinated    |                        |
| Maximum v/c Ratio: 0.71                 |                        |
| Intersection Signal Delay: 14.3         | Intersection LOS: B    |
| Intersection Capacity Utilization 71.9% | ICU Level of Service C |
| Analysis Period (min) 15                |                        |



12239.00 :: Needham Street  
20: Highland Avenue & Riverside Street

2018 Existing Conditions  
Timing Plan: Weekday Morning

| Intersection             |        |       |        |       |       |      |
|--------------------------|--------|-------|--------|-------|-------|------|
| Int Delay, s/veh         | 0.4    |       |        |       |       |      |
| Movement                 | NWL    | NWR   | NET    | NER   | SWL   | SWT  |
| Lane Configurations      | ↔      |       | ↔      |       |       | ↔    |
| Traffic Vol, veh/h       | 10     | 1     | 820    | 5     | 1     | 815  |
| Future Vol, veh/h        | 10     | 1     | 820    | 5     | 1     | 815  |
| Conflicting Peds, #/hr   | 0      | 1     | 0      | 3     | 3     | 0    |
| Sign Control             | Stop   | Stop  | Free   | Free  | Free  | Free |
| RT Channelized           | -      | None  | -      | None  | -     | None |
| Storage Length           | 0      | -     | -      | -     | -     | -    |
| Veh in Median Storage, # | 0      | -     | 0      | -     | -     | 0    |
| Grade, %                 | 0      | -     | 0      | -     | -     | 0    |
| Peak Hour Factor         | 75     | 75    | 95     | 95    | 98    | 98   |
| Heavy Vehicles, %        | 0      | 0     | 1      | 1     | 1     | 1    |
| Mvmt Flow                | 13     | 1     | 863    | 5     | 1     | 832  |
| Major/Minor              |        |       |        |       |       |      |
| Minor1                   | Major1 |       | Major2 |       |       |      |
| Conflicting Flow All     | 1703   | 870   | 0      | 0     | 871   | 0    |
| Stage 1                  | 869    | -     | -      | -     | -     | -    |
| Stage 2                  | 834    | -     | -      | -     | -     | -    |
| Critical Hdwy            | 6.4    | 6.2   | -      | -     | 4.11  | -    |
| Critical Hdwy Stg 1      | 5.4    | -     | -      | -     | -     | -    |
| Critical Hdwy Stg 2      | 5.4    | -     | -      | -     | -     | -    |
| Follow-up Hdwy           | 3.5    | 3.3   | -      | -     | 2.209 | -    |
| Pot Cap-1 Maneuver       | 102    | 354   | -      | -     | 778   | -    |
| Stage 1                  | 414    | -     | -      | -     | -     | -    |
| Stage 2                  | 430    | -     | -      | -     | -     | -    |
| Platoon blocked, %       | -      | -     | -      | -     | -     | -    |
| Mov Cap-1 Maneuver       | 102    | 353   | -      | -     | 777   | -    |
| Mov Cap-2 Maneuver       | 102    | -     | -      | -     | -     | -    |
| Stage 1                  | 413    | -     | -      | -     | -     | -    |
| Stage 2                  | 429    | -     | -      | -     | -     | -    |
| Approach                 |        |       |        |       |       |      |
| NW                       | NE     |       | SW     |       |       |      |
| HCM Control Delay, s     | 43.1   | 0     | -      | -     | 0     | -    |
| HCM LOS                  | E      | -     | -      | -     | -     | -    |
| Minor Lane/Major Mvmt    |        |       |        |       |       |      |
| NET                      | NER    | NWLn1 | SWL    | SWT   |       |      |
| Capacity (veh/h)         | -      | -     | 109    | 777   | -     | -    |
| HCM Lane V/C Ratio       | -      | -     | 0.135  | 0.001 | -     | -    |
| HCM Control Delay (s)    | -      | -     | 43.1   | 9.6   | 0     | -    |
| HCM Lane LOS             | -      | -     | E      | A     | A     | -    |
| HCM 95th %ile Q(veh)     | -      | -     | 0.4    | 0     | -     | -    |

12239.00 :: Needham Street  
21: Highland Avenue & Highland Terrace/Highland Circle

2018 Existing Conditions  
Timing Plan: Weekday Morning

| Intersection             |        |      |        |       |        |       |       |      |      |       |      |      |
|--------------------------|--------|------|--------|-------|--------|-------|-------|------|------|-------|------|------|
| Int Delay, s/veh         | 0.5    |      |        |       |        |       |       |      |      |       |      |      |
| Movement                 | SEL    | SET  | SER    | NWL   | NWT    | NWR   | NEL   | NET  | NER  | SWL   | SWT  | SWR  |
| Lane Configurations      |        | ↔    |        |       | ↔      |       |       | ↔    |      |       | ↔    |      |
| Traffic Vol, veh/h       | 1      | 0    | 5      | 5     | 0      | 5     | 5     | 820  | 5    | 2     | 820  | 5    |
| Future Vol, veh/h        | 1      | 0    | 5      | 5     | 0      | 5     | 5     | 820  | 5    | 2     | 820  | 5    |
| Conflicting Peds, #/hr   | 0      | 0    | 0      | 0     | 0      | 0     | 4     | 0    | 2    | 2     | 0    | 4    |
| Sign Control             | Stop   | Stop | Stop   | Stop  | Stop   | Stop  | Free  | Free | Free | Free  | Free | Free |
| RT Channelized           | -      | -    | None   | -     | -      | None  | -     | -    | None | -     | -    | None |
| Storage Length           | -      | -    | -      | -     | -      | -     | -     | -    | -    | -     | -    | -    |
| Veh in Median Storage, # | -      | 0    | -      | -     | 0      | -     | -     | 0    | -    | -     | 0    | -    |
| Grade, %                 | -      | 0    | -      | -     | 0      | -     | -     | 0    | -    | -     | 0    | -    |
| Peak Hour Factor         | 42     | 42   | 42     | 81    | 81     | 81    | 95    | 95   | 95   | 98    | 98   | 98   |
| Heavy Vehicles, %        | 0      | 0    | 0      | 0     | 0      | 0     | 1     | 1    | 1    | 1     | 1    | 1    |
| Mvmt Flow                | 2      | 0    | 12     | 6     | 0      | 6     | 5     | 863  | 5    | 2     | 837  | 5    |
| Major/Minor              |        |      |        |       |        |       |       |      |      |       |      |      |
| Minor2                   | Minor1 |      | Major1 |       | Major2 |       |       |      |      |       |      |      |
| Conflicting Flow All     | 1726   | 1728 | 843    | 1727  | 1728   | 868   | 846   | 0    | 0    | 870   | 0    | 0    |
| Stage 1                  | 847    | 847  | -      | 878   | 878    | -     | -     | -    | -    | -     | -    | -    |
| Stage 2                  | 879    | 881  | -      | 849   | 850    | -     | -     | -    | -    | -     | -    | -    |
| Critical Hdwy            | 7.1    | 6.5  | 6.2    | 7.1   | 6.5    | 6.2   | 4.11  | -    | -    | 4.11  | -    | -    |
| Critical Hdwy Stg 1      | 6.1    | 5.5  | -      | 6.1   | 5.5    | -     | -     | -    | -    | -     | -    | -    |
| Critical Hdwy Stg 2      | 6.1    | 5.5  | -      | 6.1   | 5.5    | -     | -     | -    | -    | -     | -    | -    |
| Follow-up Hdwy           | 3.5    | 4    | 3.3    | 3.5   | 4      | 3.3   | 2.209 | -    | -    | 2.209 | -    | -    |
| Pot Cap-1 Maneuver       | 71     | 89   | 367    | 70    | 89     | 355   | 795   | -    | -    | 779   | -    | -    |
| Stage 1                  | 359    | 381  | -      | 345   | 368    | -     | -     | -    | -    | -     | -    | -    |
| Stage 2                  | 345    | 367  | -      | 358   | 380    | -     | -     | -    | -    | -     | -    | -    |
| Platoon blocked, %       | -      | -    | -      | -     | -      | -     | -     | -    | -    | -     | -    | -    |
| Mov Cap-1 Maneuver       | 69     | 87   | 366    | 67    | 87     | 354   | 795   | -    | -    | 779   | -    | -    |
| Mov Cap-2 Maneuver       | 69     | 87   | -      | 67    | 87     | -     | -     | -    | -    | -     | -    | -    |
| Stage 1                  | 354    | 378  | -      | 340   | 363    | -     | -     | -    | -    | -     | -    | -    |
| Stage 2                  | 335    | 362  | -      | 345   | 377    | -     | -     | -    | -    | -     | -    | -    |
| Approach                 |        |      |        |       |        |       |       |      |      |       |      |      |
| SE                       | NW     |      | NE     |       | SW     |       |       |      |      |       |      |      |
| HCM Control Delay, s     | 23.1   | -    | -      | 40.7  | -      | -     | -     | 0.1  | -    | -     | 0    | -    |
| HCM LOS                  | C      | -    | -      | E     | -      | -     | -     | -    | -    | -     | -    | -    |
| Minor Lane/Major Mvmt    |        |      |        |       |        |       |       |      |      |       |      |      |
| NEL                      | NET    | NER  | NWLn1  | SELn1 | SWL    | SWT   | SWR   |      |      |       |      |      |
| Capacity (veh/h)         | 795    | -    | -      | 113   | 213    | 779   | -     | -    | -    | -     | -    | -    |
| HCM Lane V/C Ratio       | 0.007  | -    | -      | 0.109 | 0.067  | 0.003 | -     | -    | -    | -     | -    | -    |
| HCM Control Delay (s)    | 9.6    | 0    | -      | 40.7  | 23.1   | 9.6   | 0     | -    | -    | -     | -    | -    |
| HCM Lane LOS             | A      | A    | -      | E     | C      | A     | A     | -    | -    | -     | -    | -    |
| HCM 95th %ile Q(veh)     | 0      | -    | -      | 0.4   | 0.2    | 0     | -     | -    | -    | -     | -    | -    |

12239.00 :: Needham Street  
22: 2nd Avenue/Staples Driveway & Highland Avenue

2018 Existing Conditions  
Timing Plan: Weekday Morning

| Lane Group              | EBL   | EBT   | EBR  | WBL   | WBT    | WBR  | NBL   | NBT   | NBR   | SBL  | SBT   | SBR  |
|-------------------------|-------|-------|------|-------|--------|------|-------|-------|-------|------|-------|------|
| Lane Configurations     |       | ↔↔    |      |       | ↔↔     |      |       | ↔     | ↔     |      |       | ↔    |
| Traffic Volume (vph)    | 5     | 640   | 200  | 270   | 540    | 20   | 350   | 10    | 140   | 20   | 10    | 0    |
| Future Volume (vph)     | 5     | 640   | 200  | 270   | 540    | 20   | 350   | 10    | 140   | 20   | 10    | 0    |
| Ideal Flow (vphpl)      | 1900  | 1900  | 1900 | 1900  | 1900   | 1900 | 1900  | 1900  | 1900  | 1900 | 1900  | 1900 |
| Storage Length (ft)     | 0     | 0     | 0    | 0     | 100    | 150  | 100   | 100   | 0     | 0    | 50    | 0    |
| Storage Lanes           | 0     | 0     | 0    | 0     | 1      | 1    | 1     | 1     | 0     | 0    | 1     | 0    |
| Taper Length (ft)       | 25    |       |      | 25    |        |      | 25    |       |       | 25   |       |      |
| Satd. Flow (prot)       | 0     | 3427  | 0    | 0     | 3501   | 0    | 1681  | 1690  | 1583  | 0    | 1839  | 1900 |
| Flt Permitted           |       | 0.949 |      |       | 0.538  |      | 0.950 | 0.955 |       |      | 0.490 |      |
| Satd. Flow (perm)       | 0     | 3253  | 0    | 0     | 1914   | 0    | 1679  | 1688  | 1533  | 0    | 926   | 1900 |
| Right Turn on Red       |       |       | Yes  |       |        | Yes  |       | Yes   |       |      | Yes   |      |
| Satd. Flow (RTOR)       |       | 54    |      |       | 6      |      |       | 200   |       |      |       |      |
| Link Speed (mph)        |       | 30    |      |       | 30     |      |       | 30    |       |      | 30    |      |
| Link Distance (ft)      |       | 210   |      |       | 361    |      |       | 859   |       |      | 290   |      |
| Travel Time (s)         |       | 4.8   |      |       | 8.2    |      |       | 19.5  |       |      | 6.6   |      |
| Confl. Peds. (#/hr)     | 3     |       | 1    | 1     |        | 3    | 1     |       | 6     | 6    |       | 1    |
| Confl. Bikes (#/hr)     |       |       | 1    |       |        |      |       |       |       |      |       |      |
| Peak Hour Factor        | 0.89  | 0.89  | 0.89 | 0.94  | 0.94   | 0.94 | 0.93  | 0.93  | 0.93  | 0.83 | 0.83  | 0.83 |
| Heavy Vehicles (%)      | 1%    | 1%    | 1%   | 1%    | 1%     | 1%   | 2%    | 2%    | 2%    | 0%   | 0%    | 0%   |
| Shared Lane Traffic (%) |       |       |      |       |        |      | 49%   |       |       |      |       |      |
| Lane Group Flow (vph)   | 0     | 950   | 0    | 0     | 882    | 0    | 192   | 195   | 151   | 0    | 36    | 0    |
| Turn Type               | Perm  | NA    |      | pm+pt | NA     |      | Split | NA    | Perm  | Perm | NA    | Perm |
| Protected Phases        |       | 6     |      | 5     | 2      |      | 8     | 8     |       | 4    |       |      |
| Permitted Phases        | 6     |       |      | 2     |        |      |       | 8     | 4     |      | 4     |      |
| Detector Phase          | 6     | 6     |      | 5     | 2      |      | 8     | 8     | 4     | 4    | 4     | 4    |
| Switch Phase            |       |       |      |       |        |      |       |       |       |      |       |      |
| Minimum Initial (s)     | 15.0  | 15.0  |      | 4.0   | 15.0   |      | 10.0  | 10.0  | 10.0  | 4.0  | 4.0   | 4.0  |
| Minimum Split (s)       | 38.5  | 38.5  |      | 10.5  | 31.5   |      | 29.5  | 29.5  | 29.5  | 10.5 | 10.5  | 10.5 |
| Total Split (s)         | 42.0  | 42.0  |      | 25.0  | 67.0   |      | 15.0  | 15.0  | 15.0  | 8.0  | 8.0   | 8.0  |
| Total Split (%)         | 46.7% | 46.7% |      | 27.8% | 74.4%  |      | 16.7% | 16.7% | 16.7% | 8.9% | 8.9%  | 8.9% |
| Yellow Time (s)         | 4.0   | 4.0   |      | 4.0   | 4.0    |      | 3.0   | 3.0   | 3.0   | 3.0  | 3.0   | 3.0  |
| All-Red Time (s)        | 2.5   | 2.5   |      | 2.5   | 2.5    |      | 3.5   | 3.5   | 3.5   | 3.5  | 3.5   | 3.5  |
| Lost Time Adjust (s)    |       | 0.0   |      |       | 0.0    |      | 0.0   | 0.0   | 0.0   |      | 0.0   | 0.0  |
| Total Lost Time (s)     |       | 6.5   |      |       | 6.5    |      | 6.5   | 6.5   | 6.5   |      | 6.5   | 6.5  |
| Lead/Lag                | Lag   | Lag   |      | Lead  |        |      |       |       |       |      |       |      |
| Lead-Lag Optimize?      | Yes   | Yes   |      | Yes   |        |      |       |       |       |      |       |      |
| Recall Mode             | C-Min | C-Min |      | None  | C-Min  |      | None  | None  | None  | None | None  | None |
| Act Effct Green (s)     | 48.1  |       |      |       | 48.1   |      | 15.6  | 15.6  | 15.6  |      | 6.8   |      |
| Actuated g/C Ratio      | 0.53  |       |      |       | 0.53   |      | 0.17  | 0.17  | 0.17  |      | 0.08  |      |
| v/c Ratio               | 0.54  |       |      |       | 1.18dl |      | 0.66  | 0.67  | 0.35  |      | 0.51  |      |
| Control Delay           | 13.7  |       |      |       | 27.2   |      | 50.1  | 50.4  | 4.8   |      | 69.1  |      |
| Queue Delay             | 0.0   |       |      |       | 0.0    |      | 0.0   | 0.0   | 0.0   |      | 0.0   |      |
| Total Delay             | 13.7  |       |      |       | 27.2   |      | 50.1  | 50.4  | 4.8   |      | 69.1  |      |
| LOS                     | B     |       |      |       | C      |      | D     | D     | A     |      | E     |      |
| Approach Delay          | 13.7  |       |      |       | 27.2   |      |       | 37.5  |       |      | 69.1  |      |
| Approach LOS            | B     |       |      |       | C      |      |       | D     |       |      | E     |      |
| Queue Length 50th (ft)  | 171   |       |      |       | 222    |      | 107   | 108   | 0     |      | 20    |      |
| Queue Length 95th (ft)  | 155   |       |      |       | 231    |      | #280  | #284  | 28    |      | #72   |      |
| Internal Link Dist (ft) | 130   |       |      |       | 281    |      |       | 779   |       |      | 210   |      |
| Turn Bay Length (ft)    |       |       |      |       |        |      | 150   |       | 100   |      |       |      |
| Base Capacity (vph)     |       | 1763  |      |       | 1288   |      | 291   | 292   | 430   |      | 70    |      |
| Starvation Cap Reductn  |       | 0     |      |       | 0      |      | 0     | 0     | 0     |      | 0     |      |
| Spillback Cap Reductn   |       | 0     |      |       | 0      |      | 0     | 0     | 0     |      | 0     |      |
| Storage Cap Reductn     |       | 0     |      |       | 0      |      | 0     | 0     | 0     |      | 0     |      |
| Reduced v/c Ratio       |       | 0.54  |      |       | 0.68   |      | 0.66  | 0.67  | 0.35  |      | 0.51  |      |

| Intersection Summary               |                                                                                    |  |  |  |  |  |  |  |  |  |  |  |
|------------------------------------|------------------------------------------------------------------------------------|--|--|--|--|--|--|--|--|--|--|--|
| Area Type:                         | Other                                                                              |  |  |  |  |  |  |  |  |  |  |  |
| Cycle Length:                      | 90                                                                                 |  |  |  |  |  |  |  |  |  |  |  |
| Actuated Cycle Length:             | 90                                                                                 |  |  |  |  |  |  |  |  |  |  |  |
| Offset:                            | 0 (0%), Referenced to phase 2:WBTl and 6:EBTL, Start of Green, Master Intersection |  |  |  |  |  |  |  |  |  |  |  |
| Natural Cycle:                     | 90                                                                                 |  |  |  |  |  |  |  |  |  |  |  |
| Control Type:                      | Actuated-Coordinated                                                               |  |  |  |  |  |  |  |  |  |  |  |
| Maximum v/c Ratio:                 | 0.86                                                                               |  |  |  |  |  |  |  |  |  |  |  |
| Intersection Signal Delay:         | 24.8                                                                               |  |  |  |  |  |  |  |  |  |  |  |
| Intersection Capacity Utilization: | 83.4%                                                                              |  |  |  |  |  |  |  |  |  |  |  |
| ICU Level of Service               | E                                                                                  |  |  |  |  |  |  |  |  |  |  |  |
| Analysis Period (min)              | 15                                                                                 |  |  |  |  |  |  |  |  |  |  |  |
| #                                  | 95th percentile volume exceeds capacity, queue may be longer.                      |  |  |  |  |  |  |  |  |  |  |  |
|                                    | Queue shown is maximum after two cycles.                                           |  |  |  |  |  |  |  |  |  |  |  |
| dl                                 | Defacto Left Lane. Recode with 1 though lane as a left lane.                       |  |  |  |  |  |  |  |  |  |  |  |

12239.00 :: Needham Street  
22: 2nd Avenue/Staples Driveway & Highland Avenue

2018 Existing Conditions  
Timing Plan: Weekday Morning



12239.00 :: Needham Street  
23: Highland Avenue & Charles Street

2018 Existing Conditions  
Timing Plan: Weekday Morning

| Intersection             |        |      |        |       |       |      |
|--------------------------|--------|------|--------|-------|-------|------|
| Int Delay, s/veh         | 0.8    |      |        |       |       |      |
| Movement                 | EBL    | EBT  | WBT    | WBR   | SBL   | SBR  |
| Lane Configurations      |        | ↕↕   | ↕↕     |       | ↕     |      |
| Traffic Vol, veh/h       | 30     | 840  | 870    | 20    | 5     | 35   |
| Future Vol, veh/h        | 30     | 840  | 870    | 20    | 5     | 35   |
| Conflicting Peds, #/hr   | 4      | 0    | 0      | 4     | 0     | 0    |
| Sign Control             | Free   | Free | Free   | Free  | Stop  | Stop |
| RT Channelized           | -      | None | -      | None  | -     | None |
| Storage Length           | -      | -    | -      | -     | 0     | -    |
| Veh in Median Storage, # | -      | 0    | 0      | -     | 0     | -    |
| Grade, %                 | -      | 0    | 0      | -     | 0     | -    |
| Peak Hour Factor         | 97     | 97   | 98     | 98    | 82    | 82   |
| Heavy Vehicles, %        | 1      | 1    | 2      | 2     | 0     | 0    |
| Mvmt Flow                | 31     | 866  | 888    | 20    | 6     | 43   |
| Major/Minor              |        |      |        |       |       |      |
| Major1                   | Major2 |      | Minor2 |       |       |      |
| Conflicting Flow All     | 912    | 0    | -      | 0     | 1397  | 458  |
| Stage 1                  | -      | -    | -      | -     | 902   | -    |
| Stage 2                  | -      | -    | -      | -     | 495   | -    |
| Critical Hdwy            | 4.12   | -    | -      | -     | 6.8   | 6.9  |
| Critical Hdwy Stg 1      | -      | -    | -      | -     | 5.8   | -    |
| Critical Hdwy Stg 2      | -      | -    | -      | -     | 5.8   | -    |
| Follow-up Hdwy           | 2.21   | -    | -      | -     | 3.5   | 3.3  |
| Pot Cap-1 Maneuver       | 749    | -    | -      | -     | 134   | 555  |
| Stage 1                  | -      | -    | -      | -     | 361   | -    |
| Stage 2                  | -      | -    | -      | -     | 584   | -    |
| Platoon blocked, %       | -      | -    | -      | -     | -     | -    |
| Mov Cap-1 Maneuver       | 749    | -    | -      | -     | 122   | 553  |
| Mov Cap-2 Maneuver       | -      | -    | -      | -     | 122   | -    |
| Stage 1                  | -      | -    | -      | -     | 360   | -    |
| Stage 2                  | -      | -    | -      | -     | 535   | -    |
| Approach                 |        |      |        |       |       |      |
| EB                       | WB     |      | SB     |       |       |      |
| HCM Control Delay, s     | 0.7    | 0    | -      | -     | 15.7  | -    |
| HCM LOS                  | -      | -    | -      | -     | C     | -    |
| Minor Lane/Major Mvmt    |        |      |        |       |       |      |
| EBL                      | EBT    | WBT  | WBR    | SBLn1 |       |      |
| Capacity (veh/h)         | 749    | -    | -      | -     | 384   | -    |
| HCM Lane V/C Ratio       | 0.041  | -    | -      | -     | 0.127 | -    |
| HCM Control Delay (s)    | 10     | 0.4  | -      | -     | 15.7  | -    |
| HCM Lane LOS             | B      | A    | -      | -     | C     | -    |
| HCM 95th %ile Q(veh)     | 0.1    | -    | -      | -     | 0.4   | -    |

12239.00 :: Needham Street  
24: Highland Avenue & Wexford Street

2018 Existing Conditions  
Timing Plan: Weekday Morning

| Intersection             |        |      |        |       |      |      |
|--------------------------|--------|------|--------|-------|------|------|
| Int Delay, s/veh         | 7      |      |        |       |      |      |
| Movement                 | EBL    | EBT  | WBT    | WBR   | SBL  | SBR  |
| Lane Configurations      |        | ↕↕   | ↕↕     |       | ↕    |      |
| Traffic Vol, veh/h       | 115    | 830  | 855    | 30    | 40   | 75   |
| Future Vol, veh/h        | 115    | 830  | 855    | 30    | 40   | 75   |
| Conflicting Peds, #/hr   | 3      | 0    | 0      | 3     | 0    | 0    |
| Sign Control             | Free   | Free | Free   | Free  | Stop | Stop |
| RT Channelized           | -      | None | -      | None  | -    | None |
| Storage Length           | -      | -    | -      | -     | 0    | -    |
| Veh in Median Storage, # | -      | 0    | 0      | -     | 0    | -    |
| Grade, %                 | -      | 0    | 0      | -     | 0    | -    |
| Peak Hour Factor         | 96     | 96   | 97     | 97    | 85   | 85   |
| Heavy Vehicles, %        | 1      | 1    | 2      | 2     | 1    | 1    |
| Mvmt Flow                | 120    | 865  | 881    | 31    | 47   | 88   |
| Major/Minor              |        |      |        |       |      |      |
| Major1                   | Major2 |      | Minor2 |       |      |      |
| Conflicting Flow All     | 915    | 0    | -      | 0     | 1572 | 459  |
| Stage 1                  | -      | -    | -      | -     | 900  | -    |
| Stage 2                  | -      | -    | -      | -     | 672  | -    |
| Critical Hdwy            | 4.12   | -    | -      | -     | 6.82 | 6.92 |
| Critical Hdwy Stg 1      | -      | -    | -      | -     | 5.82 | -    |
| Critical Hdwy Stg 2      | -      | -    | -      | -     | 5.82 | -    |
| Follow-up Hdwy           | 2.21   | -    | -      | -     | 3.51 | 3.31 |
| Pot Cap-1 Maneuver       | 747    | -    | -      | -     | 102  | 552  |
| Stage 1                  | -      | -    | -      | -     | 360  | -    |
| Stage 2                  | -      | -    | -      | -     | 472  | -    |
| Platoon blocked, %       | -      | -    | -      | -     | -    | -    |
| Mov Cap-1 Maneuver       | 747    | -    | -      | -     | 70   | 551  |
| Mov Cap-2 Maneuver       | -      | -    | -      | -     | 70   | -    |
| Stage 1                  | -      | -    | -      | -     | 359  | -    |
| Stage 2                  | -      | -    | -      | -     | 325  | -    |
| Approach                 |        |      |        |       |      |      |
| EB                       | WB     |      | SB     |       |      |      |
| HCM Control Delay, s     | 2.4    | 0    | -      | -     | 87.4 | -    |
| HCM LOS                  | -      | -    | -      | -     | F    | -    |
| Minor Lane/Major Mvmt    |        |      |        |       |      |      |
| EBL                      | EBT    | WBT  | WBR    | SBLn1 |      |      |
| Capacity (veh/h)         | 747    | -    | -      | -     | 163  | -    |
| HCM Lane V/C Ratio       | 0.16   | -    | -      | -     | 0.83 | -    |
| HCM Control Delay (s)    | 10.7   | 1.3  | -      | -     | 87.4 | -    |
| HCM Lane LOS             | B      | A    | -      | -     | F    | -    |
| HCM 95th %ile Q(veh)     | 0.6    | -    | -      | -     | 5.6  | -    |

12239.00 :: Needham Street  
25: 1st Avenue/Riverside Community Care Driveway & Highland Avenue

2018 Existing Conditions  
Timing Plan: Weekday Morning

| Intersection             |        |        |      |        |      |        |       |      |      |      |      |      |
|--------------------------|--------|--------|------|--------|------|--------|-------|------|------|------|------|------|
| Int Delay, s/veh         | 0.7    |        |      |        |      |        |       |      |      |      |      |      |
| Movement                 | EBL    | EBT    | EBR  | WBL    | WBT  | WBR    | NBL   | NBT  | NBR  | SBL  | SBT  | SBR  |
| Lane Configurations      |        | ↕      | ↕    |        | ↕    |        |       |      | ↕    |      | ↕    | ↕    |
| Traffic Vol, veh/h       | 0      | 960    | 555  | 5      | 915  | 15     | 0     | 0    | 75   | 0    | 0    | 15   |
| Future Vol, veh/h        | 0      | 960    | 555  | 5      | 915  | 15     | 0     | 0    | 75   | 0    | 0    | 15   |
| Conflicting Peds, #/hr   | 0      | 0      | 1    | 0      | 0    | 0      | 0     | 0    | 6    | 6    | 0    | 0    |
| Sign Control             | Free   | Free   | Free | Free   | Free | Free   | Stop  | Stop | Stop | Stop | Stop | Stop |
| RT Channelized           | -      | -      | None | -      | -    | None   | -     | -    | None | -    | -    | None |
| Storage Length           | -      | -      | 0    | -      | -    | -      | -     | -    | 0    | -    | -    | 0    |
| Veh in Median Storage, # | -      | 0      | -    | -      | 0    | -      | -     | 0    | -    | -    | 0    | -    |
| Grade, %                 | -      | 0      | -    | -      | 0    | -      | -     | 0    | -    | -    | 0    | -    |
| Peak Hour Factor         | 84     | 84     | 84   | 93     | 93   | 93     | 84    | 84   | 84   | 38   | 38   | 38   |
| Heavy Vehicles, %        | 1      | 1      | 1    | 3      | 3    | 3      | 3     | 3    | 3    | 0    | 0    | 0    |
| Mvmt Flow                | 0      | 1143   | 661  | 5      | 984  | 16     | 0     | 0    | 89   | 0    | 0    | 39   |
| Major/Minor              | Major1 | Major2 |      | Minor1 |      | Minor2 |       |      |      |      |      |      |
| Conflicting Flow All     | -      | 0      | 0    | 1144   | 0    | 0      | -     | -    | 578  | -    | -    | 500  |
| Stage 1                  | -      | -      | -    | -      | -    | -      | -     | -    | -    | -    | -    | -    |
| Stage 2                  | -      | -      | -    | -      | -    | -      | -     | -    | -    | -    | -    | -    |
| Critical Hdwy            | -      | -      | -    | 4.16   | -    | -      | -     | -    | 6.96 | -    | -    | 6.9  |
| Critical Hdwy Stg 1      | -      | -      | -    | -      | -    | -      | -     | -    | -    | -    | -    | -    |
| Critical Hdwy Stg 2      | -      | -      | -    | -      | -    | -      | -     | -    | -    | -    | -    | -    |
| Follow-up Hdwy           | -      | -      | -    | 2.23   | -    | -      | -     | -    | 3.33 | -    | -    | 3.3  |
| Pot Cap-1 Maneuver       | 0      | -      | -    | 601    | -    | -      | 0     | 0    | 457  | 0    | 0    | 522  |
| Stage 1                  | 0      | -      | -    | -      | -    | -      | 0     | 0    | -    | 0    | 0    | -    |
| Stage 2                  | 0      | -      | -    | -      | -    | -      | 0     | 0    | -    | 0    | 0    | -    |
| Platoon blocked, %       | -      | -      | -    | -      | -    | -      | -     | -    | -    | -    | -    | -    |
| Mov Cap-1 Maneuver       | -      | -      | -    | 598    | -    | -      | -     | -    | 454  | -    | -    | 522  |
| Mov Cap-2 Maneuver       | -      | -      | -    | -      | -    | -      | -     | -    | -    | -    | -    | -    |
| Stage 1                  | -      | -      | -    | -      | -    | -      | -     | -    | -    | -    | -    | -    |
| Stage 2                  | -      | -      | -    | -      | -    | -      | -     | -    | -    | -    | -    | -    |
| Approach                 | EB     | WB     |      | NB     |      | SB     |       |      |      |      |      |      |
| HCM Control Delay, s     | 0      | 0.1    |      | 14.9   |      | 12.5   |       |      |      |      |      |      |
| HCM LOS                  |        |        |      | B      |      | B      |       |      |      |      |      |      |
| Minor Lane/Major Mvmt    | NBLn1  | EBT    | EBR  | WBL    | WBT  | WBR    | SBLn1 |      |      |      |      |      |
| Capacity (veh/h)         | 454    | -      | -    | 598    | -    | -      | 522   |      |      |      |      |      |
| HCM Lane V/C Ratio       | 0.197  | -      | -    | 0.009  | -    | -      | 0.076 |      |      |      |      |      |
| HCM Control Delay (s)    | 14.9   | -      | -    | 11.1   | -    | -      | 12.5  |      |      |      |      |      |
| HCM Lane LOS             | B      | -      | -    | B      | -    | -      | B     |      |      |      |      |      |
| HCM 95th %ile Q(veh)     | 0.7    | -      | -    | 0      | -    | -      | 0.2   |      |      |      |      |      |

12239.00 :: Needham Street  
26: I-95 NB Ramps & Highland Avenue

2018 Existing Conditions  
Timing Plan: Weekday Morning

| Intersection             |        |        |       |        |      |        |      |      |       |      |      |       |
|--------------------------|--------|--------|-------|--------|------|--------|------|------|-------|------|------|-------|
| Int Delay, s/veh         | 3.1    |        |       |        |      |        |      |      |       |      |      |       |
| Movement                 | EBL    | EBT    | EBR   | WBL    | WBT  | WBR    | NBL  | NBT  | NBR   | SBL  | SBT  | SBR   |
| Lane Configurations      |        | ↕      | ↕     |        | ↕    |        |      |      | ↕     |      | ↕    | ↕     |
| Traffic Vol, veh/h       | 0      | 1245   | 445   | 0      | 625  | 305    | 0    | 0    | 270   | 0    | 0    | 90    |
| Future Vol, veh/h        | 0      | 1245   | 445   | 0      | 625  | 305    | 0    | 0    | 270   | 0    | 0    | 90    |
| Conflicting Peds, #/hr   | 0      | 0      | 2     | 2      | 0    | 0      | 0    | 0    | 2     | 0    | 0    | 0     |
| Sign Control             | Free   | Free   | Free  | Free   | Free | Free   | Stop | Stop | Stop  | Stop | Stop | Yield |
| RT Channelized           | -      | -      | Yield | -      | -    | Yield  | -    | -    | Yield | -    | -    | Yield |
| Storage Length           | -      | -      | 0     | -      | -    | -      | -    | -    | 0     | -    | -    | 0     |
| Veh in Median Storage, # | -      | 0      | -     | -      | 0    | -      | -    | 0    | -     | -    | 0    | -     |
| Grade, %                 | -      | 0      | -     | -      | 0    | -      | -    | 0    | -     | -    | 0    | -     |
| Peak Hour Factor         | 95     | 95     | 95    | 94     | 94   | 94     | 97   | 97   | 97    | 93   | 93   | 93    |
| Heavy Vehicles, %        | 0      | 0      | 0     | 3      | 3    | 3      | 2    | 2    | 2     | 2    | 2    | 2     |
| Mvmt Flow                | 0      | 1311   | 468   | 0      | 665  | 324    | 0    | 0    | 278   | 0    | 0    | 97    |
| Major/Minor              | Major1 | Major2 |       | Minor1 |      | Minor2 |      |      |       |      |      |       |
| Conflicting Flow All     | -      | 0      | 0     | -      | -    | 0      | -    | -    | 659   | -    | -    | 332   |
| Stage 1                  | -      | -      | -     | -      | -    | -      | -    | -    | -     | -    | -    | -     |
| Stage 2                  | -      | -      | -     | -      | -    | -      | -    | -    | -     | -    | -    | -     |
| Critical Hdwy            | -      | -      | -     | -      | -    | -      | -    | -    | 6.94  | -    | -    | 6.94  |
| Critical Hdwy Stg 1      | -      | -      | -     | -      | -    | -      | -    | -    | -     | -    | -    | -     |
| Critical Hdwy Stg 2      | -      | -      | -     | -      | -    | -      | -    | -    | -     | -    | -    | -     |
| Follow-up Hdwy           | -      | -      | -     | -      | -    | -      | -    | -    | 3.32  | -    | -    | 3.32  |
| Pot Cap-1 Maneuver       | 0      | -      | -     | 0      | -    | -      | 0    | 0    | 406   | 0    | 0    | 664   |
| Stage 1                  | 0      | -      | -     | 0      | -    | -      | 0    | 0    | -     | 0    | 0    | -     |
| Stage 2                  | 0      | -      | -     | 0      | -    | -      | 0    | 0    | -     | 0    | 0    | -     |
| Platoon blocked, %       | -      | -      | -     | -      | -    | -      | -    | -    | -     | -    | -    | -     |
| Mov Cap-1 Maneuver       | -      | -      | -     | -      | -    | -      | -    | -    | 405   | -    | -    | 664   |
| Mov Cap-2 Maneuver       | -      | -      | -     | -      | -    | -      | -    | -    | -     | -    | -    | -     |
| Stage 1                  | -      | -      | -     | -      | -    | -      | -    | -    | -     | -    | -    | -     |
| Stage 2                  | -      | -      | -     | -      | -    | -      | -    | -    | -     | -    | -    | -     |
| Approach                 | EB     | WB     |       | NB     |      | SB     |      |      |       |      |      |       |
| HCM Control Delay, s     | 0      | 0      |       | 31.3   |      | 11.3   |      |      |       |      |      |       |
| HCM LOS                  |        |        |       | D      |      | B      |      |      |       |      |      |       |
| Minor Lane/Major Mvmt    | NBLn1  | EBT    | EBR   | WBT    | WBR  | SBLn1  |      |      |       |      |      |       |
| Capacity (veh/h)         | 405    | -      | -     | -      | -    | 664    |      |      |       |      |      |       |
| HCM Lane V/C Ratio       | 0.687  | -      | -     | -      | -    | 0.146  |      |      |       |      |      |       |
| HCM Control Delay (s)    | 31.3   | -      | -     | -      | -    | 11.3   |      |      |       |      |      |       |
| HCM Lane LOS             | D      | -      | -     | -      | -    | B      |      |      |       |      |      |       |
| HCM 95th %ile Q(veh)     | 5      | -      | -     | -      | -    | 0.5    |      |      |       |      |      |       |



12239.00 :: Needham Street  
27: I-95 SB Ramps & Highland Avenue

2018 Existing Conditions  
Timing Plan: Weekday Morning

| Intersection                                                                                                         |        |      |       |        |      |       |        |      |       |        |      |       |
|----------------------------------------------------------------------------------------------------------------------|--------|------|-------|--------|------|-------|--------|------|-------|--------|------|-------|
| Int Delay, s/veh                                                                                                     | 76.4   |      |       |        |      |       |        |      |       |        |      |       |
| Movement                                                                                                             | EBL    | EBT  | EBR   | WBL    | WBT  | WBR   | NBL    | NBT  | NBR   | SBL    | SBT  | SBR   |
| Lane Configurations                                                                                                  |        | ↕↕   |       |        | ↕↕   | ↕     |        |      | ↕     |        | ↕    | ↕     |
| Traffic Vol, veh/h                                                                                                   | 0      | 940  | 115   | 0      | 460  | 255   | 0      | 0    | 750   | 0      | 0    | 530   |
| Future Vol, veh/h                                                                                                    | 0      | 940  | 115   | 0      | 460  | 255   | 0      | 0    | 750   | 0      | 0    | 530   |
| Conflicting Peds, #/hr                                                                                               | 0      | 0    | 1     | 1      | 0    | 0     | 0      | 0    | 1     | 0      | 0    | 0     |
| Sign Control                                                                                                         | Free   | Free | Free  | Free   | Free | Free  | Stop   | Stop | Stop  | Stop   | Stop | Stop  |
| RT Channelized                                                                                                       | -      | -    | Yield | -      | -    | Yield | -      | -    | Yield | -      | -    | Yield |
| Storage Length                                                                                                       | -      | -    | -     | -      | -    | 0     | -      | -    | 0     | -      | -    | 0     |
| Veh in Median Storage, #                                                                                             | -      | 0    | -     | -      | 0    | -     | -      | 0    | -     | -      | 0    | -     |
| Grade, %                                                                                                             | -      | 0    | -     | -      | 0    | -     | -      | 0    | -     | -      | 0    | -     |
| Peak Hour Factor                                                                                                     | 98     | 98   | 98    | 98     | 98   | 98    | 91     | 91   | 91    | 98     | 98   | 98    |
| Heavy Vehicles, %                                                                                                    | 1      | 1    | 1     | 3      | 3    | 3     | 2      | 2    | 2     | 2      | 2    | 2     |
| Mvmt Flow                                                                                                            | 0      | 959  | 117   | 0      | 469  | 260   | 0      | 0    | 824   | 0      | 0    | 541   |
|                                                                                                                      |        |      |       |        |      |       |        |      |       |        |      |       |
| Major/Minor                                                                                                          | Major1 |      |       | Major2 |      |       | Minor1 |      |       | Minor2 |      |       |
| Conflicting Flow All                                                                                                 | -      | 0    | 0     | -      | -    | 0     | -      | -    | 482   | -      | -    | 235   |
| Stage 1                                                                                                              | -      | -    | -     | -      | -    | -     | -      | -    | -     | -      | -    | -     |
| Stage 2                                                                                                              | -      | -    | -     | -      | -    | -     | -      | -    | -     | -      | -    | -     |
| Critical Hdwy                                                                                                        | -      | -    | -     | -      | -    | -     | -      | -    | 6.94  | -      | -    | 6.94  |
| Critical Hdwy Stg 1                                                                                                  | -      | -    | -     | -      | -    | -     | -      | -    | -     | -      | -    | -     |
| Critical Hdwy Stg 2                                                                                                  | -      | -    | -     | -      | -    | -     | -      | -    | -     | -      | -    | -     |
| Follow-up Hdwy                                                                                                       | -      | -    | -     | -      | -    | -     | -      | -    | 3.32  | -      | -    | 3.32  |
| Pot Cap-1 Maneuver                                                                                                   | 0      | -    | -     | 0      | -    | -     | 0      | 0    | ~ 530 | 0      | 0    | 767   |
| Stage 1                                                                                                              | 0      | -    | -     | 0      | -    | -     | 0      | 0    | -     | 0      | 0    | -     |
| Stage 2                                                                                                              | 0      | -    | -     | 0      | -    | -     | 0      | 0    | -     | 0      | 0    | -     |
| Platoon blocked, %                                                                                                   | -      | -    | -     | -      | -    | -     | -      | -    | -     | -      | -    | -     |
| Mov Cap-1 Maneuver                                                                                                   | -      | -    | -     | -      | -    | -     | -      | -    | ~ 529 | -      | -    | 767   |
| Mov Cap-2 Maneuver                                                                                                   | -      | -    | -     | -      | -    | -     | -      | -    | -     | -      | -    | -     |
| Stage 1                                                                                                              | -      | -    | -     | -      | -    | -     | -      | -    | -     | -      | -    | -     |
| Stage 2                                                                                                              | -      | -    | -     | -      | -    | -     | -      | -    | -     | -      | -    | -     |
|                                                                                                                      |        |      |       |        |      |       |        |      |       |        |      |       |
| Approach                                                                                                             | EB     |      |       | WB     |      |       | NB     |      |       | SB     |      |       |
| HCM Control Delay, s                                                                                                 | 0      |      |       | 0      |      |       | 280.6  |      |       | 20.1   |      |       |
| HCM LOS                                                                                                              |        |      |       |        |      |       | F      |      |       | C      |      |       |
|                                                                                                                      |        |      |       |        |      |       |        |      |       |        |      |       |
| Minor Lane/Major Mvmt                                                                                                | NBLn1  | EBT  | EBR   | WBT    | WBR  | SBLn1 |        |      |       |        |      |       |
| Capacity (veh/h)                                                                                                     | 529    | -    | -     | -      | -    | 767   |        |      |       |        |      |       |
| HCM Lane V/C Ratio                                                                                                   | 1.558  | -    | -     | -      | -    | 0.705 |        |      |       |        |      |       |
| HCM Control Delay (s)                                                                                                | 280.6  | -    | -     | -      | -    | 20.1  |        |      |       |        |      |       |
| HCM Lane LOS                                                                                                         | F      | -    | -     | -      | -    | C     |        |      |       |        |      |       |
| HCM 95th %tile Q(veh)                                                                                                | 43.9   | -    | -     | -      | -    | 5.9   |        |      |       |        |      |       |
|                                                                                                                      |        |      |       |        |      |       |        |      |       |        |      |       |
| Notes                                                                                                                |        |      |       |        |      |       |        |      |       |        |      |       |
| ~: Volume exceeds capacity    \$: Delay exceeds 300s    +: Computation Not Defined    *: All major volume in platoon |        |      |       |        |      |       |        |      |       |        |      |       |

12239.00 :: Needham Street  
1: Chestnut Street & Route 9 WB Access Road

2018 Existing Conditions  
Timing Plan: Weekday Morning

| Intersection               |       |       |       |       |      |      |      |      |      |      |      |      |
|----------------------------|-------|-------|-------|-------|------|------|------|------|------|------|------|------|
| Intersection Delay, s/veh  | 59.7  |       |       |       |      |      |      |      |      |      |      |      |
| Intersection LOS           | F     |       |       |       |      |      |      |      |      |      |      |      |
| Movement                   | EBL   | EBT   | EBR   | WBL   | WBT  | WBR  | NBL  | NBT  | NBR  | SBL  | SBT  | SBR  |
| Lane Configurations        |       | ↕     |       |       | ↕    |      |      | ↕    |      |      | ↕    |      |
| Traffic Vol, veh/h         | 115   | 1     | 30    | 115   | 30   | 30   | 45   | 450  | 1    | 1    | 395  | 220  |
| Future Vol, veh/h          | 115   | 1     | 30    | 115   | 30   | 30   | 45   | 450  | 1    | 1    | 395  | 220  |
| Peak Hour Factor           | 0.86  | 0.86  | 0.86  | 0.94  | 0.94 | 0.94 | 0.98 | 0.98 | 0.98 | 0.97 | 0.97 | 0.97 |
| Heavy Vehicles, %          | 0     | 0     | 0     | 0     | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    |
| Mvmt Flow                  | 134   | 1     | 35    | 122   | 32   | 32   | 46   | 459  | 1    | 1    | 407  | 227  |
| Number of Lanes            | 0     | 1     | 0     | 0     | 1    | 0    | 0    | 1    | 0    | 0    | 1    | 0    |
| Approach                   | EB    |       |       | WB    |      |      | NB   |      |      | SB   |      |      |
| Opposing Approach          | WB    |       |       | EB    |      |      | SB   |      |      | NB   |      |      |
| Opposing Lanes             | 1     |       |       | 1     |      |      | 1    |      |      | 1    |      |      |
| Conflicting Approach Left  | SB    |       |       | NB    |      |      | EB   |      |      | WB   |      |      |
| Conflicting Lanes Left     | 1     |       |       | 1     |      |      | 1    |      |      | 1    |      |      |
| Conflicting Approach Right | NB    |       |       | SB    |      |      | WB   |      |      | EB   |      |      |
| Conflicting Lanes Right    | 1     |       |       | 1     |      |      | 1    |      |      | 1    |      |      |
| HCM Control Delay          | 16.1  |       |       | 16.6  |      |      | 46   |      |      | 94.9 |      |      |
| HCM LOS                    | C     |       |       | C     |      |      | E    |      |      | F    |      |      |
| Lane                       | NBLn1 | EBLn1 | WBLn1 | SBLn1 |      |      |      |      |      |      |      |      |
| Vol Left, %                | 9%    | 79%   | 66%   | 0%    |      |      |      |      |      |      |      |      |
| Vol Thru, %                | 91%   | 1%    | 17%   | 64%   |      |      |      |      |      |      |      |      |
| Vol Right, %               | 0%    | 21%   | 17%   | 36%   |      |      |      |      |      |      |      |      |
| Sign Control               | Stop  | Stop  | Stop  | Stop  |      |      |      |      |      |      |      |      |
| Traffic Vol by Lane        | 496   | 146   | 175   | 616   |      |      |      |      |      |      |      |      |
| LT Vol                     | 45    | 115   | 115   | 1     |      |      |      |      |      |      |      |      |
| Through Vol                | 450   | 1     | 30    | 395   |      |      |      |      |      |      |      |      |
| RT Vol                     | 1     | 30    | 30    | 220   |      |      |      |      |      |      |      |      |
| Lane Flow Rate             | 506   | 170   | 186   | 635   |      |      |      |      |      |      |      |      |
| Geometry Grp               | 1     | 1     | 1     | 1     |      |      |      |      |      |      |      |      |
| Degree of Util (X)         | 0.91  | 0.37  | 0.402 | 1.109 |      |      |      |      |      |      |      |      |
| Departure Headway (Hd)     | 6.783 | 8.273 | 8.182 | 6.285 |      |      |      |      |      |      |      |      |
| Convergence, Y/N           | Yes   | Yes   | Yes   | Yes   |      |      |      |      |      |      |      |      |
| Cap                        | 536   | 438   | 443   | 584   |      |      |      |      |      |      |      |      |
| Service Time               | 4.783 | 6.273 | 6.182 | 4.285 |      |      |      |      |      |      |      |      |
| HCM Lane V/C Ratio         | 0.944 | 0.388 | 0.42  | 1.087 |      |      |      |      |      |      |      |      |
| HCM Control Delay          | 46    | 16.1  | 16.6  | 94.9  |      |      |      |      |      |      |      |      |
| HCM Lane LOS               | E     | C     | C     | F     |      |      |      |      |      |      |      |      |
| HCM 95th-ile Q             | 10.8  | 1.7   | 1.9   | 19.8  |      |      |      |      |      |      |      |      |

12239.00 :: Needham Street  
2: Chestnut Street & Route 9 EB Access Road

2018 Existing Conditions  
Timing Plan: Weekday Morning

| Intersection               |       |       |       |       |      |      |      |      |      |      |      |      |
|----------------------------|-------|-------|-------|-------|------|------|------|------|------|------|------|------|
| Intersection Delay, s/veh  | 28.7  |       |       |       |      |      |      |      |      |      |      |      |
| Intersection LOS           | D     |       |       |       |      |      |      |      |      |      |      |      |
| Movement                   | EBL   | EBT   | EBR   | WBL   | WBT  | WBR  | NBL  | NBT  | NBR  | SBL  | SBT  | SBR  |
| Lane Configurations        |       |       |       |       |      |      |      |      |      |      |      |      |
| Traffic Vol, veh/h         | 175   | 150   | 5     | 1     | 2    | 20   | 2    | 300  | 20   | 95   | 445  | 2    |
| Future Vol, veh/h          | 175   | 150   | 5     | 1     | 2    | 20   | 2    | 300  | 20   | 95   | 445  | 2    |
| Peak Hour Factor           | 0.97  | 0.97  | 0.97  | 0.78  | 0.78 | 0.78 | 0.98 | 0.98 | 0.98 | 0.97 | 0.97 | 0.97 |
| Heavy Vehicles, %          | 0     | 0     | 0     | 0     | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    |
| Mvmt Flow                  | 180   | 155   | 5     | 1     | 3    | 26   | 2    | 306  | 20   | 98   | 459  | 2    |
| Number of Lanes            | 0     | 1     | 0     | 0     | 1    | 0    | 0    | 1    | 0    | 0    | 1    | 0    |
| Approach                   | EB    |       |       | WB    |      |      | NB   |      |      | SB   |      |      |
| Opposing Approach          | WB    |       |       | EB    |      |      | SB   |      |      | NB   |      |      |
| Opposing Lanes             | 1     |       |       | 1     |      |      | 1    |      |      | 1    |      |      |
| Conflicting Approach Left  | SB    |       |       | NB    |      |      | EB   |      |      | WB   |      |      |
| Conflicting Lanes Left     | 1     |       |       | 1     |      |      | 1    |      |      | 1    |      |      |
| Conflicting Approach Right | NB    |       |       | SB    |      |      | WB   |      |      | EB   |      |      |
| Conflicting Lanes Right    | 1     |       |       | 1     |      |      | 1    |      |      | 1    |      |      |
| HCM Control Delay          | 20    |       |       | 10.6  |      |      | 17   |      |      | 41.8 |      |      |
| HCM LOS                    | C     |       |       | B     |      |      | C    |      |      | E    |      |      |
| Lane                       | NBLn1 | EBLn1 | WBLn1 | SBLn1 |      |      |      |      |      |      |      |      |
| Vol Left, %                | 1%    | 53%   | 4%    | 18%   |      |      |      |      |      |      |      |      |
| Vol Thru, %                | 93%   | 45%   | 9%    | 82%   |      |      |      |      |      |      |      |      |
| Vol Right, %               | 6%    | 2%    | 87%   | 0%    |      |      |      |      |      |      |      |      |
| Sign Control               | Stop  | Stop  | Stop  | Stop  |      |      |      |      |      |      |      |      |
| Traffic Vol by Lane        | 322   | 330   | 23    | 542   |      |      |      |      |      |      |      |      |
| LT Vol                     | 2     | 175   | 1     | 95    |      |      |      |      |      |      |      |      |
| Through Vol                | 300   | 150   | 2     | 445   |      |      |      |      |      |      |      |      |
| RT Vol                     | 20    | 5     | 20    | 2     |      |      |      |      |      |      |      |      |
| Lane Flow Rate             | 329   | 340   | 29    | 559   |      |      |      |      |      |      |      |      |
| Geometry Grp               | 1     | 1     | 1     | 1     |      |      |      |      |      |      |      |      |
| Degree of Util (X)         | 0.565 | 0.624 | 0.058 | 0.91  |      |      |      |      |      |      |      |      |
| Departure Headway (Hd)     | 6.189 | 6.606 | 7.059 | 5.865 |      |      |      |      |      |      |      |      |
| Convergence, Y/N           | Yes   | Yes   | Yes   | Yes   |      |      |      |      |      |      |      |      |
| Cap                        | 582   | 548   | 505   | 620   |      |      |      |      |      |      |      |      |
| Service Time               | 4.235 | 4.65  | 5.134 | 3.904 |      |      |      |      |      |      |      |      |
| HCM Lane V/C Ratio         | 0.565 | 0.62  | 0.057 | 0.902 |      |      |      |      |      |      |      |      |
| HCM Control Delay          | 17    | 20    | 10.6  | 41.8  |      |      |      |      |      |      |      |      |
| HCM Lane LOS               | C     | C     | B     | E     |      |      |      |      |      |      |      |      |
| HCM 95th-tile Q            | 3.5   | 4.3   | 0.2   | 11.4  |      |      |      |      |      |      |      |      |

12239.00 :: Needham Street  
3: Chestnut Street & Elliot Street

2018 Existing Conditions  
Timing Plan: Weekday Morning

| Lane Group              | EBL   | EBT   | EBR  | WBL   | WBT   | WBR  | NBL   | NBT   | NBR  | SBL   | SBT   | SBR  | Ø3   |
|-------------------------|-------|-------|------|-------|-------|------|-------|-------|------|-------|-------|------|------|
| Lane Configurations     | ↔     |       |      | ↔     |       |      | ↔     |       |      | ↔     |       |      |      |
| Traffic Volume (vph)    | 160   | 235   | 55   | 10    | 190   | 45   | 85    | 200   | 5    | 60    | 275   | 305  |      |
| Future Volume (vph)     | 160   | 235   | 55   | 10    | 190   | 45   | 85    | 200   | 5    | 60    | 275   | 305  |      |
| Ideal Flow (vphpl)      | 1900  | 1900  | 1900 | 1900  | 1900  | 1900 | 1900  | 1900  | 1900 | 1900  | 1900  | 1900 |      |
| Satd. Flow (prot)       | 0     | 1831  | 0    | 0     | 1841  | 0    | 0     | 1867  | 0    | 0     | 1750  | 0    |      |
| Flt Permitted           | 0.738 |       |      | 0.978 |       |      | 0.634 |       |      | 0.938 |       |      |      |
| Satd. Flow (perm)       | 0     | 1373  | 0    | 0     | 1804  | 0    | 0     | 1201  | 0    | 0     | 1649  | 0    |      |
| Right Turn on Red       | Yes   |       |      | Yes   |       |      | Yes   |       |      | Yes   |       |      |      |
| Satd. Flow (RTOR)       | 6     |       |      | 10    |       |      | 1     |       |      | 56    |       |      |      |
| Link Speed (mph)        | 30    |       |      | 30    |       |      | 30    |       |      | 30    |       |      |      |
| Link Distance (ft)      | 764   |       |      | 972   |       |      | 2055  |       |      | 1553  |       |      |      |
| Travel Time (s)         | 17.4  |       |      | 22.1  |       |      | 46.7  |       |      | 35.3  |       |      |      |
| Confl. Peds. (#/hr)     | 2     |       |      | 2     |       |      | 2     |       |      | 3     |       |      |      |
| Peak Hour Factor        | 0.88  | 0.88  | 0.88 | 0.97  | 0.97  | 0.97 | 0.97  | 0.97  | 0.97 | 0.96  | 0.96  | 0.96 |      |
| Heavy Vehicles (%)      | 0%    | 0%    | 0%   | 0%    | 0%    | 0%   | 0%    | 0%    | 0%   | 0%    | 0%    | 0%   |      |
| Shared Lane Traffic (%) |       |       |      |       |       |      |       |       |      |       |       |      |      |
| Lane Group Flow (vph)   | 0     | 512   | 0    | 0     | 252   | 0    | 0     | 299   | 0    | 0     | 667   | 0    |      |
| Turn Type               | Perm  | NA    |      | Perm  | NA    |      | Perm  | NA    |      | Perm  | NA    |      |      |
| Protected Phases        |       |       |      |       |       |      |       |       |      |       |       |      |      |
| Permitted Phases        | 1     | 1     |      | 1     | 1     |      | 2     | 2     |      | 2     | 2     |      | 3    |
| Detector Phase          | 1     | 1     |      | 1     | 1     |      | 2     | 2     |      | 2     | 2     |      |      |
| Switch Phase            |       |       |      |       |       |      |       |       |      |       |       |      |      |
| Minimum Initial (s)     | 6.0   | 6.0   |      | 6.0   | 6.0   |      | 6.0   | 6.0   |      | 6.0   | 6.0   |      | 4.0  |
| Minimum Split (s)       | 11.0  | 11.0  |      | 11.0  | 11.0  |      | 11.0  | 11.0  |      | 11.0  | 11.0  |      | 19.0 |
| Total Split (s)         | 35.0  | 35.0  |      | 35.0  | 35.0  |      | 35.0  | 35.0  |      | 35.0  | 35.0  |      | 19.0 |
| Total Split (%)         | 32.1% | 32.1% |      | 32.1% | 32.1% |      | 50.5% | 50.5% |      | 50.5% | 50.5% |      | 17%  |
| Yellow Time (s)         | 3.0   | 3.0   |      | 3.0   | 3.0   |      | 3.0   | 3.0   |      | 3.0   | 3.0   |      | 3.0  |
| All-Red Time (s)        | 2.0   | 2.0   |      | 2.0   | 2.0   |      | 2.0   | 2.0   |      | 2.0   | 2.0   |      | 1.0  |
| Lost Time Adjust (s)    | 0.0   |       |      | 0.0   |       |      | 0.0   |       |      | 0.0   |       |      |      |
| Total Lost Time (s)     | 5.0   |       |      | 5.0   |       |      | 5.0   |       |      | 5.0   |       |      |      |
| Lead/Lag                | Lead  | Lead  |      | Lead  | Lead  |      | Lag   | Lag   |      | Lag   | Lag   |      |      |
| Lead-Lag Optimize?      |       |       |      |       |       |      |       |       |      |       |       |      |      |
| Recall Mode             | None  | None  |      | None  | None  |      | None  | None  |      | None  | None  |      | None |
| Act Effct Green (s)     | 31.1  | 31.1  |      | 31.1  | 31.1  |      | 35.4  | 35.4  |      | 35.4  | 35.4  |      |      |
| Actuated g/C Ratio      | 0.39  | 0.39  |      | 0.39  | 0.39  |      | 0.44  | 0.44  |      | 0.44  | 0.44  |      |      |
| v/c Ratio               | 0.95  | 0.95  |      | 0.35  | 0.35  |      | 0.56  | 0.56  |      | 0.87  | 0.87  |      |      |
| Control Delay           | 56.6  | 56.6  |      | 22.4  | 22.4  |      | 21.4  | 21.4  |      | 32.6  | 32.6  |      |      |
| Queue Delay             | 0.0   | 0.0   |      | 0.0   | 0.0   |      | 0.0   | 0.0   |      | 0.0   | 0.0   |      |      |
| Total Delay             | 56.6  | 56.6  |      | 22.4  | 22.4  |      | 21.4  | 21.4  |      | 32.6  | 32.6  |      |      |
| LOS                     | E     | E     |      | C     | C     |      | C     | C     |      | C     | C     |      |      |
| Approach Delay          | 56.6  | 56.6  |      | 22.4  | 22.4  |      | 21.4  | 21.4  |      | 32.6  | 32.6  |      |      |
| Approach LOS            | E     | E     |      | C     | C     |      | C     | C     |      | C     | C     |      |      |
| Queue Length 50th (ft)  | 218   | 218   |      | 76    | 76    |      | 94    | 94    |      | 239   | 239   |      |      |
| Queue Length 95th (ft)  | #657  | #657  |      | 223   | 223   |      | 233   | 233   |      | #600  | #600  |      |      |
| Internal Link Dist (ft) | 684   | 684   |      | 892   | 892   |      | 1975  | 1975  |      | 1473  | 1473  |      |      |
| Turn Bay Length (ft)    |       |       |      |       |       |      |       |       |      |       |       |      |      |
| Base Capacity (vph)     | 539   | 539   |      | 710   | 710   |      | 781   | 781   |      | 1092  | 1092  |      |      |
| Starvation Cap Reductn  | 0     | 0     |      | 0     | 0     |      | 0     | 0     |      | 0     | 0     |      |      |
| Spillback Cap Reductn   | 0     | 0     |      | 0     | 0     |      | 0     | 0     |      | 0     | 0     |      |      |
| Storage Cap Reductn     | 0     | 0     |      | 0     | 0     |      | 0     | 0     |      | 0     | 0     |      |      |
| Reduced v/c Ratio       | 0.95  | 0.95  |      | 0.35  | 0.35  |      | 0.38  | 0.38  |      | 0.61  | 0.61  |      |      |

| Intersection Summary                                            |                        |  |
|-----------------------------------------------------------------|------------------------|--|
| Area Type:                                                      | Other                  |  |
| Cycle Length: 109                                               |                        |  |
| Actuated Cycle Length: 79.6                                     |                        |  |
| Natural Cycle: 130                                              |                        |  |
| Control Type: Actuated-Uncoordinated                            |                        |  |
| Maximum v/c Ratio: 0.95                                         |                        |  |
| Intersection Signal Delay: 36.3                                 | Intersection LOS: D    |  |
| Intersection Capacity Utilization 89.5%                         | ICU Level of Service E |  |
| Analysis Period (min) 15                                        |                        |  |
| # 95th percentile volume exceeds capacity, queue may be longer. |                        |  |
| Queue shown is maximum after two cycles.                        |                        |  |



12239.00 :: Needham Street  
4: Oak Street & Chestnut Street

2018 Existing Conditions  
Timing Plan: Weekday Morning

|                         |  |  |  |  |  |  |  |  |  |  |  |  |  |
|-------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|
| Lane Group              | EBL                                                                               | EBT                                                                               | EBR                                                                               | WBL                                                                               | WBT                                                                               | WBR                                                                               | NBL                                                                               | NBT                                                                               | NBR                                                                               | SBL                                                                               | SBT                                                                               | SBR                                                                               | Ø3                                                                                |
| Lane Configurations     |  |                                                                                   |  |                                                                                   |  |                                                                                   |  |                                                                                   |  |                                                                                   |  |                                                                                   |                                                                                   |
| Traffic Volume (vph)    | 20                                                                                | 15                                                                                | 230                                                                               | 35                                                                                | 25                                                                                | 5                                                                                 | 255                                                                               | 105                                                                               | 15                                                                                | 5                                                                                 | 130                                                                               | 20                                                                                |                                                                                   |
| Future Volume (vph)     | 20                                                                                | 15                                                                                | 230                                                                               | 35                                                                                | 25                                                                                | 5                                                                                 | 255                                                                               | 105                                                                               | 15                                                                                | 5                                                                                 | 130                                                                               | 20                                                                                |                                                                                   |
| Ideal Flow (vphpl)      | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                              |                                                                                   |
| Satd. Flow (prot)       | 0                                                                                 | 1635                                                                              | 0                                                                                 | 0                                                                                 | 1827                                                                              | 0                                                                                 | 0                                                                                 | 1808                                                                              | 0                                                                                 | 0                                                                                 | 1837                                                                              | 0                                                                                 |                                                                                   |
| Flt Permitted           |                                                                                   | 0.970                                                                             |                                                                                   |                                                                                   | 0.466                                                                             |                                                                                   |                                                                                   | 0.699                                                                             |                                                                                   |                                                                                   | 0.988                                                                             |                                                                                   |                                                                                   |
| Satd. Flow (perm)       | 0                                                                                 | 1592                                                                              | 0                                                                                 | 0                                                                                 | 873                                                                               | 0                                                                                 | 0                                                                                 | 1303                                                                              | 0                                                                                 | 0                                                                                 | 1819                                                                              | 0                                                                                 |                                                                                   |
| Right Turn on Red       |                                                                                   |                                                                                   | Yes                                                                               |                                                                                   |                                                                                   | Yes                                                                               |                                                                                   |                                                                                   | Yes                                                                               |                                                                                   |                                                                                   | Yes                                                                               |                                                                                   |
| Satd. Flow (RTOR)       | 284                                                                               |                                                                                   |                                                                                   |                                                                                   | 5                                                                                 |                                                                                   |                                                                                   | 2                                                                                 |                                                                                   |                                                                                   | 8                                                                                 |                                                                                   |                                                                                   |
| Link Speed (mph)        | 30                                                                                |                                                                                   |                                                                                   |                                                                                   | 30                                                                                |                                                                                   |                                                                                   | 30                                                                                |                                                                                   |                                                                                   | 30                                                                                |                                                                                   |                                                                                   |
| Link Distance (ft)      | 2055                                                                              |                                                                                   |                                                                                   |                                                                                   | 492                                                                               |                                                                                   |                                                                                   | 226                                                                               |                                                                                   |                                                                                   | 762                                                                               |                                                                                   |                                                                                   |
| Travel Time (s)         | 46.7                                                                              |                                                                                   |                                                                                   |                                                                                   | 11.2                                                                              |                                                                                   |                                                                                   | 5.1                                                                               |                                                                                   |                                                                                   | 17.3                                                                              |                                                                                   |                                                                                   |
| Confl. Peds. (#/hr)     | 2                                                                                 |                                                                                   | 3                                                                                 | 3                                                                                 |                                                                                   | 2                                                                                 | 4                                                                                 |                                                                                   | 4                                                                                 | 4                                                                                 | 0.96                                                                              | 0.96                                                                              | 4                                                                                 |
| Peak Hour Factor        | 0.81                                                                              | 0.81                                                                              | 0.81                                                                              | 0.89                                                                              | 0.89                                                                              | 0.89                                                                              | 0.91                                                                              | 0.91                                                                              | 0.91                                                                              | 0.96                                                                              | 0.96                                                                              | 0.96                                                                              |                                                                                   |
| Heavy Vehicles (%)      | 0%                                                                                | 0%                                                                                | 0%                                                                                | 0%                                                                                | 0%                                                                                | 0%                                                                                | 1%                                                                                | 1%                                                                                | 1%                                                                                | 1%                                                                                | 1%                                                                                | 1%                                                                                |                                                                                   |
| Shared Lane Traffic (%) |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| Lane Group Flow (vph)   | 0                                                                                 | 328                                                                               | 0                                                                                 | 0                                                                                 | 73                                                                                | 0                                                                                 | 0                                                                                 | 411                                                                               | 0                                                                                 | 0                                                                                 | 161                                                                               | 0                                                                                 |                                                                                   |
| Turn Type               | Perm                                                                              | NA                                                                                |                                                                                   | Perm                                                                              | NA                                                                                |                                                                                   | Perm                                                                              | NA                                                                                |                                                                                   | Perm                                                                              | NA                                                                                |                                                                                   |                                                                                   |
| Protected Phases        | 1                                                                                 |                                                                                   |                                                                                   |                                                                                   | 1                                                                                 |                                                                                   |                                                                                   | 2                                                                                 |                                                                                   |                                                                                   | 2                                                                                 | 3                                                                                 |                                                                                   |
| Permitted Phases        | 1                                                                                 |                                                                                   |                                                                                   |                                                                                   | 1                                                                                 |                                                                                   |                                                                                   | 2                                                                                 |                                                                                   |                                                                                   | 2                                                                                 |                                                                                   |                                                                                   |
| Detector Phase          | 1                                                                                 | 1                                                                                 |                                                                                   |                                                                                   | 1                                                                                 |                                                                                   |                                                                                   | 2                                                                                 |                                                                                   |                                                                                   | 2                                                                                 |                                                                                   |                                                                                   |
| Switch Phase            |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| Minimum Initial (s)     | 8.0                                                                               | 8.0                                                                               |                                                                                   |                                                                                   | 8.0                                                                               | 8.0                                                                               |                                                                                   |                                                                                   | 8.0                                                                               | 8.0                                                                               |                                                                                   |                                                                                   | 8.0                                                                               |
| Minimum Split (s)       | 13.0                                                                              | 13.0                                                                              |                                                                                   |                                                                                   | 13.0                                                                              | 13.0                                                                              |                                                                                   |                                                                                   | 14.0                                                                              | 14.0                                                                              |                                                                                   |                                                                                   | 18.0                                                                              |
| Total Split (s)         | 35.0                                                                              | 35.0                                                                              |                                                                                   |                                                                                   | 35.0                                                                              | 35.0                                                                              |                                                                                   |                                                                                   | 36.0                                                                              | 36.0                                                                              |                                                                                   |                                                                                   | 25.0                                                                              |
| Total Split (%)         | 36.5%                                                                             | 36.5%                                                                             |                                                                                   |                                                                                   | 36.5%                                                                             | 36.5%                                                                             |                                                                                   |                                                                                   | 37.5%                                                                             | 37.5%                                                                             |                                                                                   |                                                                                   | 26%                                                                               |
| Yellow Time (s)         | 4.0                                                                               | 4.0                                                                               |                                                                                   |                                                                                   | 4.0                                                                               | 4.0                                                                               |                                                                                   |                                                                                   | 4.0                                                                               | 4.0                                                                               |                                                                                   |                                                                                   | 4.0                                                                               |
| All-Red Time (s)        | 1.0                                                                               | 1.0                                                                               |                                                                                   |                                                                                   | 1.0                                                                               | 1.0                                                                               |                                                                                   |                                                                                   | 2.0                                                                               | 2.0                                                                               |                                                                                   |                                                                                   | 1.0                                                                               |
| Lost Time Adjust (s)    | 0.0                                                                               |                                                                                   |                                                                                   |                                                                                   | 0.0                                                                               |                                                                                   |                                                                                   |                                                                                   | 0.0                                                                               |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| Total Lost Time (s)     | 5.0                                                                               |                                                                                   |                                                                                   |                                                                                   | 5.0                                                                               |                                                                                   |                                                                                   |                                                                                   | 6.0                                                                               |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| Lead/Lag                | Lead                                                                              | Lead                                                                              |                                                                                   |                                                                                   | Lead                                                                              | Lead                                                                              |                                                                                   |                                                                                   | Lag                                                                               | Lag                                                                               |                                                                                   |                                                                                   |                                                                                   |
| Lead-Lag Optimize?      |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| Recall Mode             | Min                                                                               | Min                                                                               |                                                                                   |                                                                                   | Min                                                                               | Min                                                                               |                                                                                   |                                                                                   | Min                                                                               | Min                                                                               |                                                                                   |                                                                                   | None                                                                              |
| Act Effct Green (s)     | 10.8                                                                              |                                                                                   |                                                                                   |                                                                                   | 10.8                                                                              |                                                                                   |                                                                                   |                                                                                   | 30.6                                                                              |                                                                                   |                                                                                   |                                                                                   | 30.6                                                                              |
| Actuated g/C Ratio      | 0.20                                                                              |                                                                                   |                                                                                   |                                                                                   | 0.20                                                                              |                                                                                   |                                                                                   |                                                                                   | 0.55                                                                              |                                                                                   |                                                                                   |                                                                                   | 0.55                                                                              |
| v/c Ratio               | 0.61                                                                              |                                                                                   |                                                                                   |                                                                                   | 0.42                                                                              |                                                                                   |                                                                                   |                                                                                   | 0.57                                                                              |                                                                                   |                                                                                   |                                                                                   | 0.16                                                                              |
| Control Delay           | 10.2                                                                              |                                                                                   |                                                                                   |                                                                                   | 27.7                                                                              |                                                                                   |                                                                                   |                                                                                   | 16.0                                                                              |                                                                                   |                                                                                   |                                                                                   | 9.1                                                                               |
| Queue Delay             | 0.0                                                                               |                                                                                   |                                                                                   |                                                                                   | 0.0                                                                               |                                                                                   |                                                                                   |                                                                                   | 0.0                                                                               |                                                                                   |                                                                                   |                                                                                   | 0.0                                                                               |
| Total Delay             | 10.2                                                                              |                                                                                   |                                                                                   |                                                                                   | 27.7                                                                              |                                                                                   |                                                                                   |                                                                                   | 16.0                                                                              |                                                                                   |                                                                                   |                                                                                   | 9.1                                                                               |
| LOS                     | B                                                                                 |                                                                                   |                                                                                   |                                                                                   | C                                                                                 |                                                                                   |                                                                                   |                                                                                   | B                                                                                 |                                                                                   |                                                                                   |                                                                                   | A                                                                                 |
| Approach Delay          | 10.2                                                                              |                                                                                   |                                                                                   |                                                                                   | 27.7                                                                              |                                                                                   |                                                                                   |                                                                                   | 16.0                                                                              |                                                                                   |                                                                                   |                                                                                   | 9.1                                                                               |
| Approach LOS            | B                                                                                 |                                                                                   |                                                                                   |                                                                                   | C                                                                                 |                                                                                   |                                                                                   |                                                                                   | B                                                                                 |                                                                                   |                                                                                   |                                                                                   | A                                                                                 |
| Queue Length 50th (ft)  | 11                                                                                |                                                                                   |                                                                                   |                                                                                   | 18                                                                                |                                                                                   |                                                                                   |                                                                                   | 61                                                                                |                                                                                   |                                                                                   |                                                                                   | 17                                                                                |
| Queue Length 95th (ft)  | 59                                                                                |                                                                                   |                                                                                   |                                                                                   | 64                                                                                |                                                                                   |                                                                                   |                                                                                   | #329                                                                              |                                                                                   |                                                                                   |                                                                                   | 90                                                                                |
| Internal Link Dist (ft) | 1975                                                                              |                                                                                   |                                                                                   |                                                                                   | 412                                                                               |                                                                                   |                                                                                   |                                                                                   | 146                                                                               |                                                                                   |                                                                                   |                                                                                   | 682                                                                               |
| Turn Bay Length (ft)    |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| Base Capacity (vph)     | 1017                                                                              |                                                                                   |                                                                                   |                                                                                   | 491                                                                               |                                                                                   |                                                                                   |                                                                                   | 731                                                                               |                                                                                   |                                                                                   |                                                                                   | 1023                                                                              |
| Starvation Cap Reductn  | 0                                                                                 |                                                                                   |                                                                                   |                                                                                   | 0                                                                                 |                                                                                   |                                                                                   |                                                                                   | 0                                                                                 |                                                                                   |                                                                                   |                                                                                   | 0                                                                                 |
| Spillback Cap Reductn   | 0                                                                                 |                                                                                   |                                                                                   |                                                                                   | 0                                                                                 |                                                                                   |                                                                                   |                                                                                   | 0                                                                                 |                                                                                   |                                                                                   |                                                                                   | 0                                                                                 |
| Storage Cap Reductn     | 0                                                                                 |                                                                                   |                                                                                   |                                                                                   | 0                                                                                 |                                                                                   |                                                                                   |                                                                                   | 0                                                                                 |                                                                                   |                                                                                   |                                                                                   | 0                                                                                 |
| Reduced v/c Ratio       | 0.32                                                                              |                                                                                   |                                                                                   |                                                                                   | 0.15                                                                              |                                                                                   |                                                                                   |                                                                                   | 0.56                                                                              |                                                                                   |                                                                                   |                                                                                   | 0.16                                                                              |

Intersection Summary

Area Type: Other

Cycle Length: 96

Actuated Cycle Length: 55.3

Natural Cycle: 60

Control Type: Actuated-Uncoordinated

Maximum v/c Ratio: 0.61

Intersection Signal Delay: 13.8

Intersection LOS: B

Intersection Capacity Utilization 59.5%

ICU Level of Service B

Analysis Period (min) 15

# 95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

Splits and Phases: 4: Oak Street & Chestnut Street



12239.00 :: Needham Street  
5: Oak Street & Site Driveway

2018 Existing Conditions  
Timing Plan: Weekday Morning

| Intersection             | WBL  | WBR  | NBT  | NBR  | SBL  | SBT  |
|--------------------------|------|------|------|------|------|------|
| Int Delay, s/veh         | 0.1  |      |      |      |      |      |
| Movement                 | WBL  | WBR  | NBT  | NBR  | SBL  | SBT  |
| Lane Configurations      | ↔    |      | ↔    |      | ↔    | ↔    |
| Traffic Vol, veh/h       | 1    | 1    | 375  | 1    | 1    | 395  |
| Future Vol, veh/h        | 1    | 1    | 375  | 1    | 1    | 395  |
| Conflicting Peds, #/hr   | 0    | 0    | 0    | 6    | 6    | 0    |
| Sign Control             | Stop | Stop | Free | Free | Free | Free |
| RT Channelized           | -    | None | -    | None | -    | None |
| Storage Length           | 0    | -    | -    | -    | -    | -    |
| Veh in Median Storage, # | 0    | -    | 0    | -    | -    | 0    |
| Grade, %                 | 0    | -    | 0    | -    | -    | 0    |
| Peak Hour Factor         | 50   | 50   | 91   | 91   | 85   | 85   |
| Heavy Vehicles, %        | 0    | 0    | 1    | 1    | 1    | 1    |
| Mvmt Flow                | 2    | 2    | 412  | 1    | 1    | 465  |

| Major/Minor          | Minor1 | Major1 | Major2 |
|----------------------|--------|--------|--------|
| Conflicting Flow All | 886    | 419    | 0      |
| Stage 1              | 419    | -      | -      |
| Stage 2              | 467    | -      | -      |
| Critical Hdwy        | 6.4    | 6.2    | -      |
| Critical Hdwy Stg 1  | 5.4    | -      | -      |
| Critical Hdwy Stg 2  | 5.4    | -      | -      |
| Follow-up Hdwy       | 3.5    | 3.3    | -      |
| Pot Cap-1 Maneuver   | 318    | 638    | -      |
| Stage 1              | 668    | -      | -      |
| Stage 2              | 635    | -      | -      |
| Platoon blocked, %   | -      | -      | -      |
| Mov Cap-1 Maneuver   | 316    | 635    | -      |
| Mov Cap-2 Maneuver   | 316    | -      | -      |
| Stage 1              | 665    | -      | -      |
| Stage 2              | 634    | -      | -      |

| Approach             | WB   | NB | SB |
|----------------------|------|----|----|
| HCM Control Delay, s | 13.6 | 0  | 0  |
| HCM LOS              | B    |    |    |

| Minor Lane/Major Mvmt | NBT | NBR | WBLn1 | SBL   | SBT |
|-----------------------|-----|-----|-------|-------|-----|
| Capacity (veh/h)      | -   | -   | 422   | 1145  | -   |
| HCM Lane V/C Ratio    | -   | -   | 0.009 | 0.001 | -   |
| HCM Control Delay (s) | -   | -   | 13.6  | 8.1   | 0   |
| HCM Lane LOS          | -   | -   | B     | A     | A   |
| HCM 95th %ile Q(veh)  | -   | -   | 0     | 0     | -   |

12239.00 :: Needham Street  
6: Needham Street & Oak Street/Christina Street

2018 Existing Conditions  
Timing Plan: Weekday Morning

| Lane Group               | EBL   | EBT   | EBR   | WBL   | WBT   | WBR   | NBL   | NBT   | NBR   | SBL   | SBT   | SBR  |
|--------------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|------|
| Lane Configurations      |       | EBT   | EBR   | WBL   | WBT   | WBR   | NBL   | NBT   | NBR   | SBL   | SBT   | SBR  |
| Traffic Volume (vph)     | 150   | 110   | 145   | 115   | 125   | 40    | 135   | 610   | 70    | 35    | 585   | 115  |
| Future Volume (vph)      | 150   | 110   | 145   | 115   | 125   | 40    | 135   | 610   | 70    | 35    | 585   | 115  |
| Ideal Flow (vphpl)       | 1900  | 1900  | 1900  | 1900  | 1900  | 1900  | 1900  | 1900  | 1900  | 1900  | 1900  | 1900 |
| Storage Length (ft)      | 0     | 100   | 200   | 200   | 100   | 0     | 100   | 0     | 220   | 0     | 0     | 0    |
| Storage Lanes            | 0     | 1     | 0     | 0     | 1     | 0     | 1     | 0     | 1     | 0     | 0     | 0    |
| Taper Length (ft)        | 25    |       | 25    |       | 25    |       | 25    |       | 25    |       | 25    |      |
| Satd. Flow (prot)        | 0     | 1847  | 1615  | 0     | 1820  | 0     | 1805  | 1868  | 0     | 1787  | 1834  | 0    |
| Flt Permitted            | 0.639 |       |       | 0.595 |       | 0.184 |       | 0.195 |       |       |       |      |
| Satd. Flow (perm)        | 0     | 1213  | 1579  | 0     | 1105  | 0     | 350   | 1868  | 0     | 367   | 1834  | 0    |
| Right Turn on Red        |       | Yes   |       | Yes   |       | No    |       | No    |       | No    |       |      |
| Satd. Flow (RTOR)        |       | 160   |       | 10    |       |       |       |       |       |       |       |      |
| Link Speed (mph)         | 30    |       |       | 30    |       |       | 30    |       |       | 30    |       |      |
| Link Distance (ft)       | 1238  |       |       | 516   |       |       | 754   |       |       | 275   |       |      |
| Travel Time (s)          | 28.1  |       |       | 11.7  |       |       | 17.1  |       |       | 6.3   |       |      |
| Confl. Peds. (#/hr)      | 2     |       | 1     | 1     |       | 2     |       | 1     | 1     |       |       |      |
| Peak Hour Factor         | 0.85  | 0.85  | 0.85  | 0.87  | 0.87  | 0.87  | 0.92  | 0.92  | 0.93  | 0.93  | 0.93  |      |
| Heavy Vehicles (%)       | 0%    | 0%    | 0%    | 0%    | 0%    | 0%    | 0%    | 0%    | 1%    | 1%    | 1%    |      |
| Shared Lane Traffic (%)  |       |       |       |       |       |       |       |       |       |       |       |      |
| Lane Group Flow (vph)    | 0     | 305   | 171   | 0     | 322   | 0     | 147   | 739   | 0     | 38    | 753   | 0    |
| Turn Type                | Perm  | NA    | Perm  | Perm  | NA    | Perm  | NA    | Perm  | NA    | Perm  | NA    |      |
| Protected Phases         | 4     | 4     |       | 8     |       | 2     | 2     |       | 6     |       | 6     |      |
| Permitted Phases         | 4     | 4     | 4     | 8     |       | 2     | 2     |       | 6     |       | 6     |      |
| Detector Phase           | 4     | 4     | 4     | 8     | 8     | 2     | 2     |       | 6     | 6     |       |      |
| Switch Phase             |       |       |       |       |       |       |       |       |       |       |       |      |
| Minimum Initial (s)      | 4.0   | 4.0   | 4.0   | 4.0   | 4.0   | 4.0   | 4.0   | 4.0   | 4.0   | 4.0   | 4.0   |      |
| Minimum Split (s)        | 15.0  | 15.0  | 15.0  | 15.0  | 15.0  | 24.0  | 24.0  | 24.0  | 24.0  | 24.0  | 24.0  |      |
| Total Split (s)          | 25.0  | 25.0  | 25.0  | 25.0  | 25.0  | 58.0  | 58.0  | 58.0  | 58.0  | 58.0  | 58.0  |      |
| Total Split (%)          | 30.1% | 30.1% | 30.1% | 30.1% | 30.1% | 69.9% | 69.9% | 69.9% | 69.9% | 69.9% | 69.9% |      |
| Yellow Time (s)          | 4.0   | 4.0   | 4.0   | 4.0   | 4.0   | 4.0   | 4.0   | 4.0   | 4.0   | 4.0   | 4.0   |      |
| All-Red Time (s)         | 1.0   | 1.0   | 1.0   | 1.0   | 1.0   | 2.0   | 2.0   | 2.0   | 2.0   | 2.0   | 2.0   |      |
| Lost Time Adjust (s)     | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   |      |
| Total Lost Time (s)      | 5.0   | 5.0   |       | 5.0   |       | 6.0   | 6.0   |       | 6.0   | 6.0   |       |      |
| Lead/Lag                 |       |       |       |       |       |       |       |       |       |       |       |      |
| Lead-Lag Optimize?       |       |       |       |       |       |       |       |       |       |       |       |      |
| Recall Mode              | None  | None  | None  | None  | None  | Min   | Min   | Min   | Min   |       |       |      |
| Act Effct Green (s)      | 20.5  | 20.5  |       | 20.5  |       | 32.3  | 32.3  | 32.3  | 32.3  |       |       |      |
| Actuated g/C Ratio       | 0.32  | 0.32  |       | 0.32  |       | 0.50  | 0.50  | 0.50  | 0.50  |       |       |      |
| v/c Ratio                | 0.79  | 0.28  |       | 0.89  |       | 0.84  | 0.79  | 0.21  | 0.81  |       |       |      |
| Control Delay            | 41.0  | 6.4   |       | 54.4  |       | 52.0  | 19.1  | 10.7  | 20.8  |       |       |      |
| Queue Delay              | 0.0   | 0.0   |       | 0.0   |       | 0.0   | 0.0   | 0.0   | 0.0   |       |       |      |
| Total Delay              | 41.0  | 6.4   |       | 54.4  |       | 52.0  | 19.1  | 10.7  | 20.8  |       |       |      |
| LOS                      | D     | A     |       | D     |       | D     | B     | B     | C     |       |       |      |
| Approach Delay           | 28.5  |       |       | 54.4  |       | 24.6  |       | 20.3  |       |       |       |      |
| Approach LOS             | C     |       |       | D     |       | C     |       | C     |       |       |       |      |
| Queue Length 50th (ft)   | 104   | 3     |       | 112   |       | 44    | 212   | 7     | 222   |       |       |      |
| Queue Length 95th (ft)   | #287  | 44    |       | #330  |       | #154  | 325   | 22    | 343   |       |       |      |
| Internal Link Dist. (ft) | 1158  |       |       | 436   |       |       | 674   |       | 195   |       |       |      |
| Turn Bay Length (ft)     |       | 100   |       |       |       | 100   |       | 220   |       |       |       |      |
| Base Capacity (vph)      | 388   | 614   |       | 360   |       | 289   | 1544  | 303   | 1516  |       |       |      |
| Starvation Cap Reductn   | 0     | 0     |       | 0     |       | 0     | 0     | 0     | 0     |       |       |      |
| Spillback Cap Reductn    | 0     | 0     |       | 0     |       | 0     | 0     | 0     | 0     |       |       |      |
| Storage Cap Reductn      | 0     | 0     |       | 0     |       | 0     | 0     | 0     | 0     |       |       |      |
| Reduced v/c Ratio        | 0.79  | 0.28  |       | 0.89  |       | 0.51  | 0.48  | 0.13  | 0.50  |       |       |      |

Intersection Summary

Area Type: Other  
Cycle Length: 83  
Actuated Cycle Length: 64.1  
Natural Cycle: 65  
Control Type: Actuated-Uncoordinated  
Maximum v/c Ratio: 0.89  
Intersection Signal Delay: 27.8  
Intersection Capacity Utilization 81.5%  
Analysis Period (min) 15  
# 95th percentile volume exceeds capacity, queue may be longer.  
Queue shown is maximum after two cycles.

Splits and Phases: 6: Needham Street & Oak Street/Christina Street



12239.00 :: Needham Street  
7: Needham Street & South Site Driveway

2018 Existing Conditions  
Timing Plan: Weekday Morning

| Intersection             | EBL  | EBR  | NBL  | NBT  | SBT  | SBR  |
|--------------------------|------|------|------|------|------|------|
| Int Delay, s/veh         | 0    |      |      |      |      |      |
| Movement                 | EBL  | EBR  | NBL  | NBT  | SBT  | SBR  |
| Lane Configurations      | EBL  | EBR  | NBL  | NBT  | SBT  | SBR  |
| Traffic Vol, veh/h       | 0    | 0    | 0    | 800  | 735  | 0    |
| Future Vol, veh/h        | 0    | 0    | 0    | 800  | 735  | 0    |
| Conflicting Peds, #/hr   | 0    | 0    | 7    | 0    | 0    | 7    |
| Sign Control             | Stop | Stop | Free | Free | Free | Free |
| RT Channelized           | -    | None | -    | None | -    | None |
| Storage Length           | 0    | -    | -    | -    | -    | -    |
| Veh in Median Storage, # | 0    | -    | -    | 0    | 0    | -    |
| Grade, %                 | 0    | -    | -    | 0    | 0    | -    |
| Peak Hour Factor         | 92   | 92   | 96   | 96   | 91   | 91   |
| Heavy Vehicles, %        | 0    | 0    | 1    | 1    | 1    | 1    |
| Mvmt Flow                | 0    | 0    | 0    | 833  | 808  | 0    |

| Major/Minor          | Minor2 | Major1 | Major2 |
|----------------------|--------|--------|--------|
| Conflicting Flow All | 1648   | 815    | 815    |
| Stage 1              | 815    | -      | -      |
| Stage 2              | 833    | -      | -      |
| Critical Hdwy        | 6.4    | 6.2    | 4.11   |
| Critical Hdwy Stg 1  | 5.4    | -      | -      |
| Critical Hdwy Stg 2  | 5.4    | -      | -      |
| Follow-up Hdwy       | 3.5    | 3.3    | 2.209  |
| Pot Cap-1 Maneuver   | 110    | 381    | 817    |
| Stage 1              | 439    | -      | -      |
| Stage 2              | 430    | -      | -      |
| Platoon blocked, %   |        |        |        |
| Mov Cap-1 Maneuver   | 109    | 379    | 817    |
| Mov Cap-2 Maneuver   | 109    | -      | -      |
| Stage 1              | 436    | -      | -      |
| Stage 2              | 427    | -      | -      |

| Approach             | EB | NB | SB |
|----------------------|----|----|----|
| HCM Control Delay, s | 0  | 0  | 0  |
| HCM LOS              | A  |    |    |

| Minor Lane/Major Mvmt | NBL | NBT | EBLn1 | SBT | SBR |
|-----------------------|-----|-----|-------|-----|-----|
| Capacity (veh/h)      | 817 | -   | -     | -   | -   |
| HCM Lane V/C Ratio    | -   | -   | -     | -   | -   |
| HCM Control Delay (s) | 0   | -   | 0     | -   | -   |
| HCM Lane LOS          | A   | -   | A     | -   | -   |
| HCM 95th %ile Q(veh)  | 0   | -   | -     | -   | -   |

12239.00 :: Needham Street  
8: Needham Street & Middle Site Driveway/TJMaxx Driveway

2018 Existing Conditions  
Timing Plan: Weekday Morning

| Intersection             |        |      |      |       |       |      |        |      |      |        |      |      |
|--------------------------|--------|------|------|-------|-------|------|--------|------|------|--------|------|------|
| Int Delay, s/veh         | 1.3    |      |      |       |       |      |        |      |      |        |      |      |
| Movement                 | EBL    | EBT  | EBR  | WBL   | WBT   | WBR  | NBL    | NBT  | NBR  | SBL    | SBT  | SBR  |
| Lane Configurations      |        | ↕    |      |       |       |      | ↕      | ↕    |      | ↕      | ↕    |      |
| Traffic Vol, veh/h       | 5      | 0    | 85   | 2     | 0     | 1    | 35     | 680  | 20   | 10     | 620  | 1    |
| Future Vol, veh/h        | 5      | 0    | 85   | 2     | 0     | 1    | 35     | 680  | 20   | 10     | 620  | 1    |
| Conflicting Peds, #/hr   | 0      | 0    | 0    | 0     | 0     | 0    | 7      | 0    | 4    | 4      | 0    | 7    |
| Sign Control             | Stop   | Stop | Stop | Stop  | Stop  | Stop | Free   | Free | Free | Free   | Free | Free |
| RT Channelized           | -      | -    | None | -     | -     | None | -      | -    | None | -      | -    | None |
| Storage Length           | -      | -    | -    | -     | -     | -    | 120    | -    | -    | 80     | -    | -    |
| Veh in Median Storage, # | -      | 0    | -    | -     | -     | -    | 0      | -    | -    | 0      | -    | -    |
| Grade, %                 | -      | 0    | -    | -     | 0     | -    | -      | 0    | -    | -      | 0    | -    |
| Peak Hour Factor         | 94     | 94   | 94   | 75    | 75    | 75   | 96     | 96   | 96   | 88     | 88   | 88   |
| Heavy Vehicles, %        | 0      | 0    | 0    | 0     | 0     | 0    | 1      | 1    | 1    | 1      | 1    | 1    |
| Mvmt Flow                | 5      | 0    | 90   | 3     | 0     | 1    | 36     | 708  | 21   | 11     | 705  | 1    |
| Major/Minor              | Minor2 |      |      |       |       |      | Major1 |      |      | Major2 |      |      |
| Conflicting Flow All     | 1527   | 1541 | 712  |       |       |      | 713    | 0    | 0    | 733    | 0    | 0    |
| Stage 1                  | 735    | 735  | -    |       |       |      | -      | -    | -    | -      | -    | -    |
| Stage 2                  | 792    | 806  | -    |       |       |      | -      | -    | -    | -      | -    | -    |
| Critical Hdwy            | 6.4    | 6.5  | 6.2  |       |       |      | 4.11   | -    | -    | 4.11   | -    | -    |
| Critical Hdwy Stg 1      | 5.4    | 5.5  | -    |       |       |      | -      | -    | -    | -      | -    | -    |
| Critical Hdwy Stg 2      | 5.4    | 5.5  | -    |       |       |      | -      | -    | -    | -      | -    | -    |
| Follow-up Hdwy           | 3.5    | 4    | 3.3  |       |       |      | 2.209  | -    | -    | 2.209  | -    | -    |
| Pot Cap-1 Maneuver       | 131    | 116  | 436  |       |       |      | 892    | -    | -    | 876    | -    | -    |
| Stage 1                  | 478    | 428  | -    |       |       |      | -      | -    | -    | -      | -    | -    |
| Stage 2                  | 450    | 398  | -    |       |       |      | -      | -    | -    | -      | -    | -    |
| Platoon blocked, %       |        |      |      |       |       |      | -      | -    | -    | -      | -    | -    |
| Mov Cap-1 Maneuver       | 123    | 0    | 433  |       |       |      | 892    | -    | -    | 876    | -    | -    |
| Mov Cap-2 Maneuver       | 123    | 0    | -    |       |       |      | -      | -    | -    | -      | -    | -    |
| Stage 1                  | 469    | 0    | -    |       |       |      | -      | -    | -    | -      | -    | -    |
| Stage 2                  | 429    | 0    | -    |       |       |      | -      | -    | -    | -      | -    | -    |
| Approach                 | EB     |      |      |       |       |      | NB     |      |      | SB     |      |      |
| HCM Control Delay, s     | 17.6   |      |      |       |       |      | 0.4    |      |      | 0.1    |      |      |
| HCM LOS                  | C      |      |      |       |       |      |        |      |      |        |      |      |
| Minor Lane/Major Mvmt    | NBL    | NBT  | NBR  | EBLn1 | SBL   | SBT  | SBR    |      |      |        |      |      |
| Capacity (veh/h)         | 892    | -    | -    | 380   | 876   | -    | -      |      |      |        |      |      |
| HCM Lane V/C Ratio       | 0.041  | -    | -    | 0.252 | 0.013 | -    | -      |      |      |        |      |      |
| HCM Control Delay (s)    | 9.2    | -    | -    | 17.6  | 9.2   | -    | -      |      |      |        |      |      |
| HCM Lane LOS             | A      | -    | -    | C     | A     | -    | -      |      |      |        |      |      |
| HCM 95th %tile Q(veh)    | 0.1    | -    | -    | 1     | 0     | -    | -      |      |      |        |      |      |

12239.00 :: Needham Street  
9: Needham Street & North Site Driveway/Charlemont Street

2018 Existing Conditions  
Timing Plan: Weekday Morning

| Intersection             |        |      |      |        |       |       |        |      |      |        |      |      |
|--------------------------|--------|------|------|--------|-------|-------|--------|------|------|--------|------|------|
| Int Delay, s/veh         | 12.7   |      |      |        |       |       |        |      |      |        |      |      |
| Movement                 | EBL    | EBT  | EBR  | WBL    | WBT   | WBR   | NBL    | NBT  | NBR  | SBL    | SBT  | SBR  |
| Lane Configurations      |        | ↕    |      |        | ↕     |       | ↕      | ↕    |      | ↕      | ↕    |      |
| Traffic Vol, veh/h       | 80     | 0    | 30   | 15     | 15    | 15    | 25     | 640  | 20   | 5      | 585  | 65   |
| Future Vol, veh/h        | 80     | 0    | 30   | 15     | 15    | 15    | 25     | 640  | 20   | 5      | 585  | 65   |
| Conflicting Peds, #/hr   | 0      | 0    | 0    | 0      | 0     | 0     | 7      | 0    | 3    | 3      | 0    | 7    |
| Sign Control             | Stop   | Stop | Stop | Stop   | Stop  | Stop  | Free   | Free | Free | Free   | Free | Free |
| RT Channelized           | -      | -    | None | -      | -     | None  | -      | -    | None | -      | -    | None |
| Storage Length           | -      | -    | -    | -      | -     | -     | 80     | -    | -    | 230    | -    | -    |
| Veh in Median Storage, # | -      | 0    | -    | -      | 0     | -     | -      | -    | -    | 0      | -    | -    |
| Grade, %                 | -      | 0    | -    | -      | 0     | -     | -      | 0    | -    | -      | 0    | -    |
| Peak Hour Factor         | 95     | 95   | 95   | 92     | 92    | 92    | 98     | 98   | 98   | 87     | 87   | 87   |
| Heavy Vehicles, %        | 0      | 0    | 0    | 0      | 0     | 0     | 1      | 1    | 1    | 1      | 1    | 1    |
| Mvmt Flow                | 84     | 0    | 32   | 16     | 16    | 16    | 26     | 653  | 20   | 6      | 672  | 75   |
| Major/Minor              | Minor2 |      |      | Minor1 |       |       | Major1 |      |      | Major2 |      |      |
| Conflicting Flow All     | 1459   | 1455 | 717  | 1454   | 1483  | 666   | 754    | 0    | 0    | 676    | 0    | 0    |
| Stage 1                  | 728    | 728  | -    | 717    | 717   | -     | -      | -    | -    | -      | -    | -    |
| Stage 2                  | 731    | 727  | -    | 737    | 766   | -     | -      | -    | -    | -      | -    | -    |
| Critical Hdwy            | 7.1    | 6.5  | 6.2  | 7.1    | 6.5   | 6.2   | 4.11   | -    | -    | 4.11   | -    | -    |
| Critical Hdwy Stg 1      | 6.1    | 5.5  | -    | 6.1    | 5.5   | -     | -      | -    | -    | -      | -    | -    |
| Critical Hdwy Stg 2      | 6.1    | 5.5  | -    | 6.1    | 5.5   | -     | -      | -    | -    | -      | -    | -    |
| Follow-up Hdwy           | 3.5    | 4    | 3.3  | 3.5    | 4     | 3.3   | 2.209  | -    | -    | 2.209  | -    | -    |
| Pot Cap-1 Maneuver       | 108    | 131  | 433  | 109    | 126   | 463   | 861    | -    | -    | 920    | -    | -    |
| Stage 1                  | 418    | 432  | -    | 424    | 437   | -     | -      | -    | -    | -      | -    | -    |
| Stage 2                  | 416    | 432  | -    | 413    | 415   | -     | -      | -    | -    | -      | -    | -    |
| Platoon blocked, %       |        |      |      |        |       |       | -      | -    | -    | -      | -    | -    |
| Mov Cap-1 Maneuver       | 90     | 125  | 430  | 98     | 120   | 462   | 861    | -    | -    | 920    | -    | -    |
| Mov Cap-2 Maneuver       | 90     | 125  | -    | 98     | 120   | -     | -      | -    | -    | -      | -    | -    |
| Stage 1                  | 403    | 427  | -    | 410    | 423   | -     | -      | -    | -    | -      | -    | -    |
| Stage 2                  | 374    | 418  | -    | 380    | 410   | -     | -      | -    | -    | -      | -    | -    |
| Approach                 | EB     |      |      | WB     |       |       | NB     |      |      | SB     |      |      |
| HCM Control Delay, s     | 157    |      |      | 42     |       |       | 0.3    |      |      | 0.1    |      |      |
| HCM LOS                  | F      |      |      | E      |       |       |        |      |      |        |      |      |
| Minor Lane/Major Mvmt    | NBL    | NBT  | NBR  | EBLn1  | WBLn1 | SBL   | SBT    | SBR  |      |        |      |      |
| Capacity (veh/h)         | 861    | -    | -    | 115    | 145   | 920   | -      | -    |      |        |      |      |
| HCM Lane V/C Ratio       | 0.03   | -    | -    | 1.007  | 0.337 | 0.006 | -      | -    |      |        |      |      |
| HCM Control Delay (s)    | 9.3    | -    | -    | 157    | 42    | 8.9   | -      | -    |      |        |      |      |
| HCM Lane LOS             | A      | -    | -    | F      | E     | A     | -      | -    |      |        |      |      |
| HCM 95th %ile Q(veh)     | 0.1    | -    | -    | 6.6    | 1.4   | 0     | -      | -    |      |        |      |      |

12239.00 :: Needham Street  
10: Needham Street & Tower Road/Industrial Place

2018 Existing Conditions  
Timing Plan: Weekday Morning

| Intersection                                                                                                         |                         |       |          |       |          |          |        |      |      |       |      |      |  |  |  |  |  |  |
|----------------------------------------------------------------------------------------------------------------------|-------------------------|-------|----------|-------|----------|----------|--------|------|------|-------|------|------|--|--|--|--|--|--|
| Int Delay, s/veh                                                                                                     | 56.5                    |       |          |       |          |          |        |      |      |       |      |      |  |  |  |  |  |  |
| Movement                                                                                                             | EBL                     | EBT   | EBR      | WBL   | WBT      | WBR      | NBL    | NBT  | NBR  | SBL   | SBT  | SBR  |  |  |  |  |  |  |
| Lane Configurations                                                                                                  | <div>↔↔↔↔↔↔↔↔↔↔↔↔</div> |       |          |       |          |          |        |      |      |       |      |      |  |  |  |  |  |  |
| Traffic Vol, veh/h                                                                                                   | 65                      | 5     | 75       | 65    | 5        | 45       | 65     | 665  | 40   | 20    | 520  | 55   |  |  |  |  |  |  |
| Future Vol, veh/h                                                                                                    | 65                      | 5     | 75       | 65    | 5        | 45       | 65     | 665  | 40   | 20    | 520  | 55   |  |  |  |  |  |  |
| Conflicting Peds, #/hr                                                                                               | 0                       | 0     | 8        | 8     | 0        | 0        | 9      | 0    | 2    | 2     | 0    | 9    |  |  |  |  |  |  |
| Sign Control                                                                                                         | Stop                    | Stop  | Stop     | Stop  | Stop     | Stop     | Free   | Free | Free | Free  | Free | Free |  |  |  |  |  |  |
| RT Channelized                                                                                                       | -                       | -     | None     | -     | -        | None     | -      | -    | None | -     | -    | None |  |  |  |  |  |  |
| Storage Length                                                                                                       | -                       | -     | -        | -     | -        | -        | -      | -    | -    | -     | -    | -    |  |  |  |  |  |  |
| Veh in Median Storage, #                                                                                             | -                       | 0     | -        | -     | 0        | -        | -      | 0    | -    | -     | 0    | -    |  |  |  |  |  |  |
| Grade, %                                                                                                             | -                       | 0     | -        | -     | 0        | -        | -      | 0    | -    | -     | 0    | -    |  |  |  |  |  |  |
| Peak Hour Factor                                                                                                     | 83                      | 83    | 83       | 86    | 86       | 86       | 90     | 90   | 90   | 95    | 95   | 95   |  |  |  |  |  |  |
| Heavy Vehicles, %                                                                                                    | 1                       | 1     | 1        | 1     | 1        | 1        | 0      | 0    | 0    | 1     | 1    | 1    |  |  |  |  |  |  |
| Mvmt Flow                                                                                                            | 78                      | 6     | 90       | 76    | 6        | 52       | 72     | 739  | 44   | 21    | 547  | 58   |  |  |  |  |  |  |
| Major/Minor                                                                                                          | Minor2                  |       | Minor1   |       | Major1   |          | Major2 |      |      |       |      |      |  |  |  |  |  |  |
| Conflicting Flow All                                                                                                 | 1562                    | 1557  | 593      | 1583  | 1564     | 763      | 614    | 0    | 0    | 785   | 0    | 0    |  |  |  |  |  |  |
| Stage 1                                                                                                              | 627                     | 627   | -        | 908   | 908      | -        | -      | -    | -    | -     | -    | -    |  |  |  |  |  |  |
| Stage 2                                                                                                              | 935                     | 930   | -        | 675   | 656      | -        | -      | -    | -    | -     | -    | -    |  |  |  |  |  |  |
| Critical Hdwy                                                                                                        | 7.11                    | 6.51  | 6.21     | 7.11  | 6.51     | 6.21     | 4.1    | -    | -    | 4.11  | -    | -    |  |  |  |  |  |  |
| Critical Hdwy Stg 1                                                                                                  | 6.11                    | 5.51  | -        | 6.11  | 5.51     | -        | -      | -    | -    | -     | -    | -    |  |  |  |  |  |  |
| Critical Hdwy Stg 2                                                                                                  | 6.11                    | 5.51  | -        | 6.11  | 5.51     | -        | -      | -    | -    | -     | -    | -    |  |  |  |  |  |  |
| Follow-up Hdwy                                                                                                       | 3.509                   | 4.009 | 3.309    | 3.509 | 4.009    | 3.309    | 2.2    | -    | -    | 2.209 | -    | -    |  |  |  |  |  |  |
| Pot Cap-1 Maneuver                                                                                                   | 91                      | 113   | 507      | 88    | 112      | 406      | 975    | -    | -    | 838   | -    | -    |  |  |  |  |  |  |
| Stage 1                                                                                                              | 473                     | 478   | -        | 331   | 356      | -        | -      | -    | -    | -     | -    | -    |  |  |  |  |  |  |
| Stage 2                                                                                                              | 320                     | 347   | -        | 445   | 464      | -        | -      | -    | -    | -     | -    | -    |  |  |  |  |  |  |
| Platoon blocked, %                                                                                                   |                         |       |          |       |          |          |        |      |      |       |      |      |  |  |  |  |  |  |
| Mov Cap-1 Maneuver                                                                                                   | ~ 65                    | 93    | 500      | ~ 59  | 93       | 405      | 969    | -    | -    | 838   | -    | -    |  |  |  |  |  |  |
| Mov Cap-2 Maneuver                                                                                                   | ~ 65                    | 93    | -        | ~ 59  | 93       | -        | -      | -    | -    | -     | -    | -    |  |  |  |  |  |  |
| Stage 1                                                                                                              | 407                     | 456   | -        | 286   | 308      | -        | -      | -    | -    | -     | -    | -    |  |  |  |  |  |  |
| Stage 2                                                                                                              | 237                     | 300   | -        | 344   | 443      | -        | -      | -    | -    | -     | -    | -    |  |  |  |  |  |  |
| Approach                                                                                                             | EB                      |       | WB       |       | NB       |          | SB     |      |      |       |      |      |  |  |  |  |  |  |
| HCM Control Delay, s                                                                                                 | \$ 311.3                |       | \$ 343.4 |       | 0.8      |          | 0.3    |      |      |       |      |      |  |  |  |  |  |  |
| HCM LOS                                                                                                              | F                       |       | F        |       |          |          |        |      |      |       |      |      |  |  |  |  |  |  |
| Minor Lane/Major Mvmt                                                                                                | NBL                     |       | NBT      | NBR   | EBLn1    | WBLn1    | SBL    | SBT  | SBR  |       |      |      |  |  |  |  |  |  |
| Capacity (veh/h)                                                                                                     | 969                     |       | -        | -     | 120      | 91       | 838    | -    | -    |       |      |      |  |  |  |  |  |  |
| HCM Lane V/C Ratio                                                                                                   | 0.075                   |       | -        | -     | 1.456    | 1.469    | 0.025  | -    | -    |       |      |      |  |  |  |  |  |  |
| HCM Control Delay (s)                                                                                                | 9                       |       | 0        | -     | \$ 311.3 | \$ 343.4 | 9.4    | 0    | -    |       |      |      |  |  |  |  |  |  |
| HCM Lane LOS                                                                                                         | A                       |       | A        | -     | F        | F        | A      | A    | -    |       |      |      |  |  |  |  |  |  |
| HCM 95th %tile Q(veh)                                                                                                | 0.2                     |       | -        | -     | 12.2     | 10.2     | 0.1    | -    | -    |       |      |      |  |  |  |  |  |  |
| Notes                                                                                                                |                         |       |          |       |          |          |        |      |      |       |      |      |  |  |  |  |  |  |
| ~: Volume exceeds capacity    \$: Delay exceeds 300s    +: Computation Not Defined    *: All major volume in platoon |                         |       |          |       |          |          |        |      |      |       |      |      |  |  |  |  |  |  |

12239.00 :: Needham Street  
11: Needham Street & Jaconnet Street

2018 Existing Conditions  
Timing Plan: Weekday Morning

| Intersection             |        |      |        |       |        |      |
|--------------------------|--------|------|--------|-------|--------|------|
| Int Delay, s/veh         | 3      |      |        |       |        |      |
| Movement                 | WBL    | WBR  | NBT    | NBR   | SBL    | SBT  |
| Lane Configurations      | ↔      |      | ↔      |       |        | ↔    |
| Traffic Vol, veh/h       | 55     | 30   | 680    | 30    | 10     | 575  |
| Future Vol, veh/h        | 55     | 30   | 680    | 30    | 10     | 575  |
| Conflicting Peds, #/hr   | 0      | 1    | 0      | 33    | 33     | 0    |
| Sign Control             | Stop   | Stop | Free   | Free  | Free   | Free |
| RT Channelized           | -      | None | -      | None  | -      | None |
| Storage Length           | 0      | -    | -      | -     | -      | -    |
| Veh in Median Storage, # | 0      | -    | 0      | -     | -      | 0    |
| Grade, %                 | 0      | -    | 0      | -     | -      | 0    |
| Peak Hour Factor         | 84     | 84   | 96     | 96    | 94     | 94   |
| Heavy Vehicles, %        | 0      | 0    | 1      | 1     | 1      | 1    |
| Mvmt Flow                | 65     | 36   | 708    | 31    | 11     | 612  |
| Major/Minor              | Minor1 |      | Major1 |       | Major2 |      |
| Conflicting Flow All     | 1390   | 758  | 0      | 0     | 773    | 0    |
| Stage 1                  | 757    | -    | -      | -     | -      | -    |
| Stage 2                  | 633    | -    | -      | -     | -      | -    |
| Critical Hdwy            | 6.4    | 6.2  | -      | -     | 4.11   | -    |
| Critical Hdwy Stg 1      | 5.4    | -    | -      | -     | -      | -    |
| Critical Hdwy Stg 2      | 5.4    | -    | -      | -     | -      | -    |
| Follow-up Hdwy           | 3.5    | 3.3  | -      | -     | 2.209  | -    |
| Pot Cap-1 Maneuver       | 158    | 410  | -      | -     | 847    | -    |
| Stage 1                  | 467    | -    | -      | -     | -      | -    |
| Stage 2                  | 533    | -    | -      | -     | -      | -    |
| Platoon blocked, %       |        |      |        |       |        |      |
| Mov Cap-1 Maneuver       | 151    | 398  | -      | -     | 846    | -    |
| Mov Cap-2 Maneuver       | 151    | -    | -      | -     | -      | -    |
| Stage 1                  | 454    | -    | -      | -     | -      | -    |
| Stage 2                  | 522    | -    | -      | -     | -      | -    |
| Approach                 | WB     |      | NB     |       | SB     |      |
| HCM Control Delay, s     | 42.5   |      | 0      |       | 0.2    |      |
| HCM LOS                  | E      |      |        |       |        |      |
| Minor Lane/Major Mvmt    | NBT    |      | NBR    | WBLn1 | SBL    | SBT  |
| Capacity (veh/h)         | -      |      | -      | 193   | 846    | -    |
| HCM Lane V/C Ratio       | -      |      | -      | 0.524 | 0.013  | -    |
| HCM Control Delay (s)    | -      |      | -      | 42.5  | 9.3    | 0    |
| HCM Lane LOS             | -      |      | -      | E     | A      | A    |
| HCM 95th %ile Q(veh)     | -      |      | -      | 2.7   | 0      | -    |

12239.00 :: Needham Street  
12: Needham Street & Rockland Street

2018 Existing Conditions  
Timing Plan: Weekday Morning

| Intersection             |        |      |        |       |        |      |
|--------------------------|--------|------|--------|-------|--------|------|
| Int Delay, s/veh         | 0.3    |      |        |       |        |      |
| Movement                 | WBL    | WBR  | NBT    | NBR   | SBL    | SBT  |
| Lane Configurations      | ↔      |      | ↔      |       | ↔      | ↔    |
| Traffic Vol, veh/h       | 5      | 10   | 700    | 15    | 15     | 625  |
| Future Vol, veh/h        | 5      | 10   | 700    | 15    | 15     | 625  |
| Conflicting Peds, #/hr   | 1      | 0    | 0      | 7     | 7      | 0    |
| Sign Control             | Stop   | Stop | Free   | Free  | Free   | Free |
| RT Channelized           | -      | None | -      | None  | -      | None |
| Storage Length           | 0      | -    | -      | -     | 125    | -    |
| Veh in Median Storage, # | 0      | -    | 0      | -     | -      | 0    |
| Grade, %                 | 0      | -    | 0      | -     | -      | 0    |
| Peak Hour Factor         | 85     | 85   | 98     | 98    | 92     | 92   |
| Heavy Vehicles, %        | 0      | 0    | 1      | 1     | 1      | 1    |
| Mvmt Flow                | 6      | 12   | 714    | 15    | 16     | 679  |
| Major/Minor              |        |      |        |       |        |      |
|                          | Minor1 |      | Major1 |       | Major2 |      |
| Conflicting Flow All     | 1442   | 729  | 0      | 0     | 737    | 0    |
| Stage 1                  | 729    | -    | -      | -     | -      | -    |
| Stage 2                  | 713    | -    | -      | -     | -      | -    |
| Critical Hdwy            | 6.4    | 6.2  | -      | -     | 4.11   | -    |
| Critical Hdwy Stg 1      | 5.4    | -    | -      | -     | -      | -    |
| Critical Hdwy Stg 2      | 5.4    | -    | -      | -     | -      | -    |
| Follow-up Hdwy           | 3.5    | 3.3  | -      | -     | 2.209  | -    |
| Pot Cap-1 Maneuver       | 147    | 426  | -      | -     | 873    | -    |
| Stage 1                  | 481    | -    | -      | -     | -      | -    |
| Stage 2                  | 489    | -    | -      | -     | -      | -    |
| Platoon blocked, %       | -      | -    | -      | -     | -      | -    |
| Mov Cap-1 Maneuver       | 143    | 424  | -      | -     | 873    | -    |
| Mov Cap-2 Maneuver       | 143    | -    | -      | -     | -      | -    |
| Stage 1                  | 478    | -    | -      | -     | -      | -    |
| Stage 2                  | 480    | -    | -      | -     | -      | -    |
| Approach                 |        |      |        |       |        |      |
|                          | WB     |      | NB     |       | SB     |      |
| HCM Control Delay, s     | 20.1   |      | 0      |       | 0.2    |      |
| HCM LOS                  | C      |      |        |       |        |      |
| Minor Lane/Major Mvmt    |        |      |        |       |        |      |
|                          | NBT    | NBR  | WBLn1  | SBL   | SBT    |      |
| Capacity (veh/h)         | -      | -    | 256    | 873   | -      | -    |
| HCM Lane V/C Ratio       | -      | -    | 0.069  | 0.019 | -      | -    |
| HCM Control Delay (s)    | -      | -    | 20.1   | 9.2   | -      | -    |
| HCM Lane LOS             | -      | -    | C      | A     | -      | -    |
| HCM 95th %tile Q(veh)    | -      | -    | 0.2    | 0.1   | -      | -    |

12239.00 :: Needham Street  
13: Needham Street & Avalon Driveway/Columbia Avenue

2018 Existing Conditions  
Timing Plan: Weekday Morning

| Lane Group              | EBL   | EBT   | EBR   | WBL   | WBT   | WBR  | NBL   | NBT   | NBR  | SBL   | SBT   | SBR  |
|-------------------------|-------|-------|-------|-------|-------|------|-------|-------|------|-------|-------|------|
| Lane Configurations     |       | R     | L     |       | R     | L    |       | R     | L    |       | R     | L    |
| Traffic Volume (vph)    | 10    | 0     | 15    | 5     | 1     | 5    | 25    | 735   | 5    | 1     | 575   | 10   |
| Future Volume (vph)     | 10    | 0     | 15    | 5     | 1     | 5    | 25    | 735   | 5    | 1     | 575   | 10   |
| Ideal Flow (vphpl)      | 1900  | 1900  | 1900  | 1900  | 1900  | 1900 | 1900  | 1900  | 1900 | 1900  | 1900  | 1900 |
| Storage Length (ft)     | 0     |       | 50    | 0     |       | 0    | 125   | 0     |      | 560   | 0     |      |
| Storage Lanes           | 0     |       | 1     | 0     |       | 0    | 1     | 0     |      | 1     | 0     |      |
| Taper Length (ft)       | 25    |       |       | 25    |       |      | 25    |       |      | 25    |       |      |
| Satd. Flow (prot)       | 0     | 1805  | 1615  | 0     | 1592  | 0    | 1787  | 1879  | 0    | 1787  | 1874  | 0    |
| Flt Permitted           |       |       |       |       |       |      | 0.397 |       |      | 0.238 |       |      |
| Satd. Flow (perm)       | 0     | 1891  | 1576  | 0     | 1626  | 0    | 741   | 1879  | 0    | 448   | 1874  | 0    |
| Right Turn on Red       |       | Yes   |       |       | Yes   |      |       | Yes   |      |       | Yes   |      |
| Satd. Flow (RTOR)       |       | 43    |       |       | 7     |      |       | 1     |      |       | 4     |      |
| Link Speed (mph)        | 30    |       |       | 30    |       |      | 30    |       |      | 30    |       |      |
| Link Distance (ft)      | 190   |       |       | 435   |       |      | 338   |       |      | 1135  |       |      |
| Travel Time (s)         | 4.3   |       |       | 9.9   |       |      | 7.7   |       |      | 25.8  |       |      |
| Confl. Peds. (#/hr)     | 2     |       | 2     | 2     |       | 2    | 9     |       | 5    | 5     |       | 9    |
| Peak Hour Factor        | 0.65  | 0.65  | 0.65  | 0.75  | 0.75  | 0.75 | 0.84  | 0.84  | 0.84 | 0.93  | 0.93  | 0.93 |
| Heavy Vehicles (%)      | 0%    | 0%    | 0%    | 8%    | 8%    | 8%   | 1%    | 1%    | 1%   | 1%    | 1%    | 1%   |
| Shared Lane Traffic (%) |       |       |       |       |       |      |       |       |      |       |       |      |
| Lane Group Flow (vph)   | 0     | 15    | 23    | 0     | 15    | 0    | 30    | 881   | 0    | 1     | 629   | 0    |
| Turn Type               | Perm  | NA    | Perm  | Perm  | NA    | Perm | NA    | Perm  | NA   | Perm  | NA    |      |
| Protected Phases        |       | 8     |       |       | 4     |      |       | 2     |      |       | 6     |      |
| Permitted Phases        |       | 8     |       | 8     | 4     |      | 2     |       |      | 6     |       |      |
| Detector Phase          |       | 8     | 8     | 8     | 4     | 4    |       | 2     | 2    |       | 6     | 6    |
| Switch Phase            |       |       |       |       |       |      |       |       |      |       |       |      |
| Minimum Initial (s)     | 4.0   | 4.0   | 4.0   | 4.0   | 4.0   |      | 10.0  | 10.0  |      | 10.0  | 10.0  |      |
| Minimum Split (s)       | 25.0  | 25.0  | 25.0  | 22.0  | 22.0  |      | 17.0  | 17.0  |      | 23.0  | 23.0  |      |
| Total Split (s)         | 12.0  | 12.0  | 12.0  | 12.0  | 12.0  |      | 65.0  | 65.0  |      | 65.0  | 65.0  |      |
| Total Split (%)         | 15.6% | 15.6% | 15.6% | 15.6% | 15.6% |      | 84.4% | 84.4% |      | 84.4% | 84.4% |      |
| Yellow Time (s)         | 4.0   | 4.0   | 4.0   | 4.0   | 4.0   |      | 4.0   | 4.0   |      | 4.0   | 4.0   |      |
| All-Red Time (s)        | 2.0   | 2.0   | 2.0   | 2.0   | 2.0   |      | 2.0   | 2.0   |      | 2.0   | 2.0   |      |
| Lost Time Adjust (s)    | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   |      | 0.0   | 0.0   |      | 0.0   | 0.0   |      |
| Total Lost Time (s)     | 6.0   | 6.0   |       | 6.0   |       |      | 6.0   | 6.0   |      | 6.0   | 6.0   |      |
| Lead/Lag                |       |       |       |       |       |      |       |       |      |       |       |      |
| Lead-Lag Optimize?      |       |       |       |       |       |      |       |       |      |       |       |      |
| Recall Mode             | None  | None  | None  | None  | None  |      | None  | None  |      | None  | None  |      |
| Act Effct Green (s)     | 8.2   | 8.2   |       | 8.1   |       |      | 34.6  | 34.6  |      | 34.6  | 34.6  |      |
| Actuated g/C Ratio      | 0.20  | 0.20  |       | 0.20  |       |      | 0.86  | 0.86  |      | 0.86  | 0.86  |      |
| v/c Ratio               | 0.04  | 0.06  |       | 0.04  |       |      | 0.05  | 0.55  |      | 0.00  | 0.39  |      |
| Control Delay           | 22.6  | 4.8   |       | 18.3  |       |      | 4.0   | 6.5   |      | 4.0   | 4.6   |      |
| Queue Delay             | 0.0   | 0.0   |       | 0.0   |       |      | 0.0   | 0.0   |      | 0.0   | 0.0   |      |
| Total Delay             | 22.6  | 4.8   |       | 18.3  |       |      | 4.0   | 6.5   |      | 4.0   | 4.6   |      |
| LOS                     | C     | A     |       | B     |       |      | A     | A     |      | A     | A     |      |
| Approach Delay          | 11.8  |       |       | 18.3  |       |      |       | 6.4   |      |       | 4.6   |      |
| Approach LOS            | B     |       |       | B     |       |      |       | A     |      |       | A     |      |
| Queue Length 50th (ft)  | 2     | 0     |       | 1     |       |      | 0     | 0     |      | 0     | 0     |      |
| Queue Length 95th (ft)  | 17    | 2     |       | 16    |       |      | 14    | 371   |      | 2     | 242   |      |
| Internal Link Dist (ft) | 110   |       |       | 355   |       |      |       | 258   |      |       | 1055  |      |
| Turn Bay Length (ft)    |       | 50    |       |       |       |      | 125   |       |      | 560   |       |      |
| Base Capacity (vph)     | 469   | 424   |       | 409   |       |      | 690   | 1750  |      | 417   | 1745  |      |
| Starvation Cap Reductn  | 0     | 0     |       | 0     |       |      | 0     | 0     |      | 0     | 0     |      |
| Spillback Cap Reductn   | 0     | 0     |       | 0     |       |      | 0     | 0     |      | 0     | 0     |      |
| Storage Cap Reductn     | 0     | 0     |       | 0     |       |      | 0     | 0     |      | 0     | 0     |      |
| Reduced v/c Ratio       | 0.03  | 0.05  |       | 0.04  |       |      | 0.04  | 0.50  |      | 0.00  | 0.36  |      |

| Intersection Summary                    |                        |
|-----------------------------------------|------------------------|
| Area Type:                              | Other                  |
| Cycle Length: 77                        |                        |
| Actuated Cycle Length: 40.3             |                        |
| Natural Cycle: 65                       |                        |
| Control Type: Actuated-Uncoordinated    |                        |
| Maximum v/c Ratio: 0.55                 |                        |
| Intersection Signal Delay: 5.9          | Intersection LOS: A    |
| Intersection Capacity Utilization 54.7% | ICU Level of Service A |
| Analysis Period (min) 15                |                        |

Splits and Phases: 13: Needham Street & Avalon Driveway/Columbia Avenue



12239.00 :: Needham Street  
14: Winchester Street & Needham Street/Dedham Street

2018 Existing Conditions  
Timing Plan: Weekday Morning

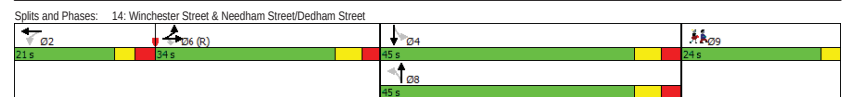
| Lane Group                                                      | EBL   | EBT   | EBR   | WBL   | WBT   | WBR  | NBL   | NBT   | NBR  | SBL   | SBT   | SBR   | Ø9 |
|-----------------------------------------------------------------|-------|-------|-------|-------|-------|------|-------|-------|------|-------|-------|-------|----|
| Lane Configurations                                             | ↰     | ↱     | ↱     | ↰     | ↱     | ↱    | ↰     | ↱     | ↱    | ↰     | ↱     | ↱     |    |
| Traffic Volume (vph)                                            | 570   | 100   | 35    | 20    | 80    | 75   | 15    | 285   | 15   | 60    | 275   | 455   |    |
| Future Volume (vph)                                             | 570   | 100   | 35    | 20    | 80    | 75   | 15    | 285   | 15   | 60    | 275   | 455   |    |
| Ideal Flow (vphpl)                                              | 1900  | 1900  | 1900  | 1900  | 1900  | 1900 | 1900  | 1900  | 1900 | 1900  | 1900  | 1900  |    |
| Storage Length (ft)                                             | 340   |       | 75    | 0     |       | 0    | 50    |       | 0    | 0     |       | 0     |    |
| Storage Lanes                                                   | 1     |       | 1     | 0     |       | 0    | 0     |       | 0    | 0     |       | 1     |    |
| Taper Length (ft)                                               | 25    |       |       | 25    |       |      | 25    |       |      | 25    |       |       |    |
| Satd. Flow (prot)                                               | 1715  | 1744  | 1615  | 0     | 1779  | 0    | 0     | 1881  | 0    | 0     | 1864  | 1599  |    |
| Flt Permitted                                                   | 0.950 | 0.966 |       |       | 0.314 |      |       | 0.858 |      |       | 0.697 |       |    |
| Satd. Flow (perm)                                               | 1715  | 1744  | 1615  | 0     | 562   | 0    | 0     | 1617  | 0    | 0     | 1311  | 1561  |    |
| Right Turn on Red                                               |       |       | Yes   |       |       | No   |       |       | Yes  |       |       | Yes   |    |
| Satd. Flow (RTOR)                                               |       |       | 114   |       |       |      |       | 2     |      |       |       | 434   |    |
| Link Speed (mph)                                                |       | 30    |       |       | 30    |      |       | 30    |      |       | 30    |       |    |
| Link Distance (ft)                                              |       | 1135  |       |       | 451   |      |       | 634   |      |       | 722   |       |    |
| Travel Time (s)                                                 |       | 25.8  |       |       | 10.3  |      |       | 14.4  |      |       | 16.4  |       |    |
| Confl. Peds. (#/hr)                                             |       |       |       |       |       |      | 8     |       |      |       |       | 8     |    |
| Confl. Bikes (#/hr)                                             |       |       |       |       |       |      |       | 1     |      |       |       |       |    |
| Peak Hour Factor                                                | 0.93  | 0.93  | 0.93  | 0.90  | 0.90  | 0.90 | 0.81  | 0.81  | 0.81 | 0.87  | 0.87  | 0.87  |    |
| Heavy Vehicles (%)                                              | 0%    | 0%    | 0%    | 0%    | 0%    | 0%   | 0%    | 0%    | 0%   | 1%    | 1%    | 1%    |    |
| Shared Lane Traffic (%)                                         | 42%   |       |       |       |       |      |       |       |      |       |       |       |    |
| Lane Group Flow (vph)                                           | 356   | 365   | 38    | 0     | 194   | 0    | 0     | 390   | 0    | 0     | 385   | 523   |    |
| Turn Type                                                       | Split | NA    | Perm  | Perm  | NA    |      | Perm  | NA    |      | Perm  | NA    | Free  |    |
| Protected Phases                                                | 6     | 6     |       |       | 2     |      |       | 8     |      |       | 4     |       | 9  |
| Permitted Phases                                                |       |       | 6     | 2     |       |      | 8     |       |      | 4     |       | Free  |    |
| Detector Phase                                                  | 6     | 6     | 6     | 2     | 2     |      | 8     | 8     |      | 4     | 4     |       |    |
| Switch Phase                                                    |       |       |       |       |       |      |       |       |      |       |       |       |    |
| Minimum Initial (s)                                             | 10.0  | 10.0  | 10.0  | 6.0   | 6.0   |      | 6.0   | 6.0   |      | 6.0   | 6.0   | 7.0   |    |
| Minimum Split (s)                                               | 19.0  | 19.0  | 19.0  | 19.0  | 19.0  |      | 21.0  | 21.0  |      | 21.0  | 21.0  | 24.0  |    |
| Total Split (s)                                                 | 34.0  | 34.0  | 34.0  | 21.0  | 21.0  |      | 45.0  | 45.0  |      | 45.0  | 45.0  | 24.0  |    |
| Total Split (%)                                                 | 27.4% | 27.4% | 27.4% | 16.9% | 16.9% |      | 36.3% | 36.3% |      | 36.3% | 36.3% | 19%   |    |
| Yellow Time (s)                                                 | 4.0   | 4.0   | 4.0   | 3.0   | 3.0   |      | 4.0   | 4.0   |      | 4.0   | 4.0   | 3.0   |    |
| All-Red Time (s)                                                | 3.0   | 3.0   | 3.0   | 3.0   | 3.0   |      | 3.0   | 3.0   |      | 3.0   | 3.0   | 0.0   |    |
| Lost Time Adjust (s)                                            | 0.0   | 0.0   | 0.0   |       | 0.0   |      |       | 0.0   |      |       | 0.0   |       |    |
| Total Lost Time (s)                                             | 7.0   | 7.0   | 7.0   |       | 6.0   |      |       | 7.0   |      |       | 7.0   |       |    |
| Lead/Lag                                                        |       |       |       |       |       |      |       |       |      |       |       |       |    |
| Lead-Lag Optimize?                                              |       |       |       |       |       |      |       |       |      |       |       |       |    |
| Recall Mode                                                     | C-Min | C-Min | C-Min | Min   | Min   |      | None  | None  |      | None  | None  | None  |    |
| Act Effct Green (s)                                             | 27.0  | 27.0  | 27.0  |       | 34.9  |      |       | 37.3  |      |       | 37.3  | 124.0 |    |
| Actuated g/C Ratio                                              | 0.22  | 0.22  | 0.22  |       | 0.28  |      |       | 0.30  |      |       | 0.30  | 1.00  |    |
| v/c Ratio                                                       | 0.95  | 0.96  | 0.96  |       | 1.23  |      |       | 0.80  |      |       | 0.98  | 0.34  |    |
| Control Delay                                                   | 84.7  | 86.2  | 0.4   |       | 185.4 |      |       | 53.3  |      |       | 83.6  | 0.6   |    |
| Queue Delay                                                     | 0.0   | 0.0   | 0.0   |       | 0.0   |      |       | 0.0   |      |       | 0.0   | 0.0   |    |
| Total Delay                                                     | 84.7  | 86.2  | 0.4   |       | 185.4 |      |       | 53.3  |      |       | 83.6  | 0.6   |    |
| LOS                                                             | F     | F     | A     |       | F     |      |       | D     |      |       | F     | A     |    |
| Approach Delay                                                  |       |       |       |       | 185.4 |      |       | 53.3  |      |       | 35.8  |       |    |
| Approach LOS                                                    |       |       | F     |       | F     |      |       | D     |      |       | D     |       |    |
| Queue Length 50th (ft)                                          | 298   | 307   | 0     |       | ~176  |      |       | 284   |      |       | 303   | 0     |    |
| Queue Length 95th (ft)                                          | #498  | #510  | 0     |       | #419  |      |       | 354   |      |       | #475  | 0     |    |
| Internal Link Dist (ft)                                         |       |       | 1055  |       | 371   |      |       | 554   |      |       | 642   |       |    |
| Turn Bay Length (ft)                                            | 340   |       | 75    |       |       |      |       |       |      |       |       |       |    |
| Base Capacity (vph)                                             | 373   | 379   | 440   |       | 158   |      |       | 496   |      |       | 401   | 1561  |    |
| Starvation Cap Reductn                                          | 0     | 0     | 0     |       | 0     |      |       | 0     |      |       | 0     | 0     |    |
| Spillback Cap Reductn                                           | 0     | 0     | 0     |       | 0     |      |       | 0     |      |       | 0     | 0     |    |
| Storage Cap Reductn                                             | 0     | 0     | 0     |       | 0     |      |       | 0     |      |       | 0     | 0     |    |
| Reduced v/c Ratio                                               | 0.95  | 0.96  | 0.09  |       | 1.23  |      |       | 0.79  |      |       | 0.96  | 0.34  |    |
| Intersection Summary                                            |       |       |       |       |       |      |       |       |      |       |       |       |    |
| Area Type: Other                                                |       |       |       |       |       |      |       |       |      |       |       |       |    |
| Cycle Length: 124                                               |       |       |       |       |       |      |       |       |      |       |       |       |    |
| Actuated Cycle Length: 124                                      |       |       |       |       |       |      |       |       |      |       |       |       |    |
| Offset: 85 (69%), Referenced to phase 6:EBTL, Start of Green    |       |       |       |       |       |      |       |       |      |       |       |       |    |
| Natural Cycle: 145                                              |       |       |       |       |       |      |       |       |      |       |       |       |    |
| Control Type: Actuated-Coordinated                              |       |       |       |       |       |      |       |       |      |       |       |       |    |
| Maximum v/c Ratio: 1.23                                         |       |       |       |       |       |      |       |       |      |       |       |       |    |
| Intersection Signal Delay: 67.0                                 |       |       |       |       |       |      |       |       |      |       |       |       |    |
| Intersection Capacity Utilization 82.8%                         |       |       |       |       |       |      |       |       |      |       |       |       |    |
| ICU Level of Service E                                          |       |       |       |       |       |      |       |       |      |       |       |       |    |
| Analysis Period (min) 15                                        |       |       |       |       |       |      |       |       |      |       |       |       |    |
| ~ Volume exceeds capacity, queue is theoretically infinite.     |       |       |       |       |       |      |       |       |      |       |       |       |    |
| Queue shown is maximum after two cycles.                        |       |       |       |       |       |      |       |       |      |       |       |       |    |
| # 95th percentile volume exceeds capacity, queue may be longer. |       |       |       |       |       |      |       |       |      |       |       |       |    |
| Queue shown is maximum after two cycles.                        |       |       |       |       |       |      |       |       |      |       |       |       |    |

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VHB\MSD

Lanes, Volumes, Timings  
06/01/2018

12239.00 :: Needham Street  
14: Winchester Street & Needham Street/Dedham Street

2018 Existing Conditions  
Timing Plan: Weekday Morning



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VHB\MSD

Lanes, Volumes, Timings  
06/01/2018



12239.00 :: Needham Street  
15: Winchester Street & Route 9 EB Access Road

2018 Existing Conditions  
Timing Plan: Weekday Morning

| Intersection                                                                                                         |          |        |          |        |       |      |
|----------------------------------------------------------------------------------------------------------------------|----------|--------|----------|--------|-------|------|
| Int Delay, s/veh                                                                                                     | 47.3     |        |          |        |       |      |
| Movement                                                                                                             | WBL      | WBR    | NBT      | NBR    | SBL   | SBT  |
| Lane Configurations                                                                                                  | W        |        | R        |        | L     | R    |
| Traffic Vol, veh/h                                                                                                   | 35       | 135    | 790      | 235    | 120   | 855  |
| Future Vol, veh/h                                                                                                    | 35       | 135    | 790      | 235    | 120   | 855  |
| Conflicting Peds, #/hr                                                                                               | 0        | 0      | 0        | 9      | 9     | 0    |
| Sign Control                                                                                                         | Stop     | Stop   | Free     | Free   | Free  | Free |
| RT Channelized                                                                                                       | -        | None   | -        | None   | -     | None |
| Storage Length                                                                                                       | 0        | -      | -        | -      | -     | -    |
| Veh in Median Storage, #                                                                                             | 0        | -      | 0        | -      | -     | 0    |
| Grade, %                                                                                                             | 0        | -      | 0        | -      | -     | 0    |
| Peak Hour Factor                                                                                                     | 77       | 77     | 92       | 92     | 98    | 98   |
| Heavy Vehicles, %                                                                                                    | 1        | 1      | 0        | 0      | 1     | 1    |
| Mvmt Flow                                                                                                            | 45       | 175    | 859      | 255    | 122   | 872  |
| Major/Minor                                                                                                          | Minor1   | Major1 |          | Major2 |       |      |
| Conflicting Flow All                                                                                                 | 2112     | 995    | 0        | 0      | 1123  | 0    |
| Stage 1                                                                                                              | 995      | -      | -        | -      | -     | -    |
| Stage 2                                                                                                              | 1117     | -      | -        | -      | -     | -    |
| Critical Hdwy                                                                                                        | 6.41     | 6.21   | -        | -      | 4.11  | -    |
| Critical Hdwy Stg 1                                                                                                  | 5.41     | -      | -        | -      | -     | -    |
| Critical Hdwy Stg 2                                                                                                  | 5.41     | -      | -        | -      | -     | -    |
| Follow-up Hdwy                                                                                                       | 3.509    | 3.309  | -        | -      | 2.209 | -    |
| Pot Cap-1 Maneuver                                                                                                   | 56       | 298    | -        | -      | 626   | -    |
| Stage 1                                                                                                              | 359      | -      | -        | -      | -     | -    |
| Stage 2                                                                                                              | 314      | -      | -        | -      | -     | -    |
| Platoon blocked, %                                                                                                   | -        | -      | -        | -      | -     | -    |
| Mov Cap-1 Maneuver                                                                                                   | ~ 35     | 296    | -        | -      | 626   | -    |
| Mov Cap-2 Maneuver                                                                                                   | ~ 35     | -      | -        | -      | -     | -    |
| Stage 1                                                                                                              | 356      | -      | -        | -      | -     | -    |
| Stage 2                                                                                                              | 195      | -      | -        | -      | -     | -    |
| Approach                                                                                                             | WB       | NB     |          | SB     |       |      |
| HCM Control Delay, s                                                                                                 | \$ 492.2 | 0      |          | 1.5    |       |      |
| HCM LOS                                                                                                              | F        |        |          |        |       |      |
| Minor Lane/Major Mvmt                                                                                                | NBT      | NBR    | WBLn1    | SBL    | SBT   |      |
| Capacity (veh/h)                                                                                                     | -        | -      | 117      | 626    | -     |      |
| HCM Lane V/C Ratio                                                                                                   | -        | -      | 1.887    | 0.196  | -     |      |
| HCM Control Delay (s)                                                                                                | -        | -      | \$ 492.2 | 12.1   | 0     |      |
| HCM Lane LOS                                                                                                         | -        | -      | F        | B      | A     |      |
| HCM 95th %ile Q(veh)                                                                                                 | -        | -      | 17.7     | 0.7    | -     |      |
| Notes                                                                                                                |          |        |          |        |       |      |
| ~: Volume exceeds capacity    \$: Delay exceeds 300s    +: Computation Not Defined    *: All major volume in platoon |          |        |          |        |       |      |

12239.00 :: Needham Street  
16: Winchester Street/Centre Street & Route 9 WB Access Road

2018 Existing Conditions  
Timing Plan: Weekday Morning

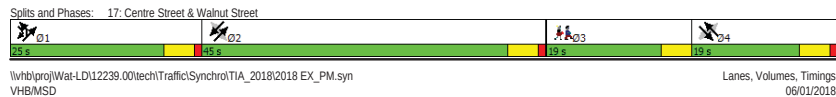
| Intersection                                                                                                         |        |           |       |           |        |      |      |        |      |      |      |      |
|----------------------------------------------------------------------------------------------------------------------|--------|-----------|-------|-----------|--------|------|------|--------|------|------|------|------|
| Int Delay, s/veh                                                                                                     | 125.7  |           |       |           |        |      |      |        |      |      |      |      |
| Movement                                                                                                             | EBL    | EBT       | EBR   | WBL       | WBT    | WBR  | NBL  | NBT    | NBR  | SBL  | SBT  | SBR  |
| Lane Configurations                                                                                                  |        | R         |       |           | R      |      | L    | R      |      | L    | R    |      |
| Traffic Vol, veh/h                                                                                                   | 5      | 0         | 35    | 110       | 10     | 20   | 125  | 800    | 0    | 0    | 830  | 110  |
| Future Vol, veh/h                                                                                                    | 5      | 0         | 35    | 110       | 10     | 20   | 125  | 800    | 0    | 0    | 830  | 110  |
| Conflicting Peds, #/hr                                                                                               | 0      | 0         | 0     | 0         | 0      | 0    | 14   | 0      | 9    | 9    | 0    | 14   |
| Sign Control                                                                                                         | Stop   | Stop      | Stop  | Stop      | Stop   | Stop | Free | Free   | Free | Free | Free | Free |
| RT Channelized                                                                                                       | -      | -         | None  | -         | -      | None | -    | -      | None | -    | -    | Free |
| Storage Length                                                                                                       | -      | -         | -     | -         | -      | 50   | 0    | -      | -    | -    | -    | -    |
| Veh in Median Storage, #                                                                                             | -      | 0         | -     | -         | 0      | -    | -    | 0      | -    | -    | 0    | -    |
| Grade, %                                                                                                             | -      | 0         | -     | -         | 0      | -    | -    | 0      | -    | -    | 0    | -    |
| Peak Hour Factor                                                                                                     | 64     | 64        | 64    | 78        | 78     | 78   | 96   | 96     | 96   | 99   | 99   | 99   |
| Heavy Vehicles, %                                                                                                    | 0      | 0         | 0     | 0         | 0      | 0    | 0    | 0      | 0    | 1    | 1    | 1    |
| Mvmt Flow                                                                                                            | 8      | 0         | 55    | 141       | 13     | 26   | 130  | 833    | 0    | 0    | 838  | 111  |
| Major/Minor                                                                                                          | Minor2 | Minor1    |       |           | Major1 |      |      | Major2 |      |      |      |      |
| Conflicting Flow All                                                                                                 | 1952   | 1946      | 852   | 1960      | 833    | 852  | 0    | -      | -    | -    | -    | 0    |
| Stage 1                                                                                                              | 852    | 852       | -     | 1094      | 1094   | -    | -    | -      | -    | -    | -    | -    |
| Stage 2                                                                                                              | 1100   | 1094      | -     | 866       | 852    | -    | -    | -      | -    | -    | -    | -    |
| Critical Hdwy                                                                                                        | 7.1    | 6.5       | 6.2   | 7.1       | 6.5    | 6.2  | 4.1  | -      | -    | -    | -    | -    |
| Critical Hdwy Stg 1                                                                                                  | 6.1    | 5.5       | -     | 6.1       | 5.5    | -    | -    | -      | -    | -    | -    | -    |
| Critical Hdwy Stg 2                                                                                                  | 6.1    | 5.5       | -     | 6.1       | 5.5    | -    | -    | -      | -    | -    | -    | -    |
| Follow-up Hdwy                                                                                                       | 3.5    | 4         | 3.3   | 3.5       | 4      | 3.3  | 2.2  | -      | -    | -    | -    | -    |
| Pot Cap-1 Maneuver                                                                                                   | 49     | 66        | 362   | ~ 48      | 66     | 372  | 795  | -      | 0    | 0    | -    | 0    |
| Stage 1                                                                                                              | 357    | 379       | -     | 262       | 292    | -    | -    | -      | 0    | 0    | -    | 0    |
| Stage 2                                                                                                              | 260    | 292       | -     | 351       | 379    | -    | -    | -      | 0    | 0    | -    | 0    |
| Platoon blocked, %                                                                                                   | -      | -         | -     | -         | -      | -    | -    | -      | -    | -    | -    | -    |
| Mov Cap-1 Maneuver                                                                                                   | 33     | 55        | 358   | ~ 36      | 55     | 372  | 795  | -      | -    | -    | -    | -    |
| Mov Cap-2 Maneuver                                                                                                   | 33     | 55        | -     | ~ 36      | 55     | -    | -    | -      | -    | -    | -    | -    |
| Stage 1                                                                                                              | 295    | 375       | -     | 219       | 244    | -    | -    | -      | -    | -    | -    | -    |
| Stage 2                                                                                                              | 192    | 244       | -     | 297       | 375    | -    | -    | -      | -    | -    | -    | -    |
| Approach                                                                                                             | EB     | WB        |       |           | NB     |      |      | SB     |      |      |      |      |
| HCM Control Delay, s                                                                                                 | 41.2   | \$ 1409.4 |       |           | 1.4    |      |      | 0      |      |      |      |      |
| HCM LOS                                                                                                              | E      | F         |       |           |        |      |      |        |      |      |      |      |
| Minor Lane/Major Mvmt                                                                                                | NBL    | NBT       | EBLn1 | WBLn1     | WBLn2  | SBT  |      |        |      |      |      |      |
| Capacity (veh/h)                                                                                                     | 795    | -         | 160   | 37        | 372    | -    |      |        |      |      |      |      |
| HCM Lane V/C Ratio                                                                                                   | 0.164  | -         | 0.391 | 4.158     | 0.069  | -    |      |        |      |      |      |      |
| HCM Control Delay (s)                                                                                                | 10.4   | -         | 41.2  | \$ 1641.7 | 15.4   | -    |      |        |      |      |      |      |
| HCM Lane LOS                                                                                                         | B      | -         | E     | F         | C      | -    |      |        |      |      |      |      |
| HCM 95th %ile Q(veh)                                                                                                 | 0.6    | -         | 1.7   | 17.8      | 0.2    | -    |      |        |      |      |      |      |
| Notes                                                                                                                |        |           |       |           |        |      |      |        |      |      |      |      |
| ~: Volume exceeds capacity    \$: Delay exceeds 300s    +: Computation Not Defined    *: All major volume in platoon |        |           |       |           |        |      |      |        |      |      |      |      |

12239.00 :: Needham Street  
17: Centre Street & Walnut Street

2018 Existing Conditions  
Timing Plan: Weekday Morning

| Lane Group              | SEL   | SET   | SER   | NWL   | NWT   | NWR  | NEL   | NET  | NER   | SWL   | SWT  | SWR  | Ø3 |
|-------------------------|-------|-------|-------|-------|-------|------|-------|------|-------|-------|------|------|----|
| Lane Configurations     |       |       |       |       |       |      |       |      |       |       |      |      |    |
| Traffic Volume (vph)    | 30    | 2     | 380   | 15    | 50    | 0    | 350   | 465  | 10    | 2     | 545  | 60   |    |
| Future Volume (vph)     | 30    | 2     | 380   | 15    | 50    | 0    | 350   | 465  | 10    | 2     | 545  | 60   |    |
| Ideal Flow (vphpl)      | 1900  | 1900  | 1900  | 1900  | 1900  | 1900 | 1900  | 1900 | 1900  | 1900  | 1900 | 1900 |    |
| Storage Length (ft)     | 0     |       | 50    | 0     |       | 0    | 75    | 0    |       | 0     |      | 0    |    |
| Storage Lanes           | 0     |       | 1     | 0     |       | 0    | 1     | 0    |       | 0     |      | 0    |    |
| Taper Length (ft)       | 25    |       |       | 25    |       |      | 25    |      |       | 25    |      |      |    |
| Satd. Flow (prot)       | 0     | 1814  | 1615  | 0     | 1879  | 0    | 1787  | 1875 | 0     | 0     | 1852 | 0    |    |
| Flt Permitted           |       | 0.740 |       |       | 0.920 |      | 0.257 |      |       | 0.999 |      |      |    |
| Satd. Flow (perm)       | 0     | 1360  | 1558  | 0     | 1733  | 0    | 483   | 1875 | 0     | 0     | 1850 | 0    |    |
| Right Turn on Red       |       |       | No    |       | No    |      |       | Yes  |       |       | Yes  |      |    |
| Satd. Flow (RTOR)       |       |       |       |       |       |      | 2     |      |       | 6     |      |      |    |
| Link Speed (mph)        |       | 30    |       |       | 30    |      |       | 30   |       |       | 30   |      |    |
| Link Distance (ft)      |       | 624   |       |       | 387   |      |       | 508  |       |       | 531  |      |    |
| Travel Time (s)         |       | 14.2  |       |       | 8.8   |      |       | 11.5 |       |       | 12.1 |      |    |
| Confl. Peds. (#/hr)     | 11    |       | 10    | 10    |       | 11   | 4     |      | 8     | 8     |      | 4    |    |
| Peak Hour Factor        | 0.95  | 0.95  | 0.95  | 0.92  | 0.92  | 0.92 | 0.98  | 0.98 | 0.98  | 0.92  | 0.92 | 0.92 |    |
| Heavy Vehicles (%)      | 0%    | 0%    | 0%    | 0%    | 0%    | 0%   | 1%    | 1%   | 1%    | 1%    | 1%   | 1%   |    |
| Shared Lane Traffic (%) |       |       |       |       |       |      |       |      |       |       |      |      |    |
| Lane Group Flow (vph)   | 0     | 34    | 400   | 0     | 70    | 0    | 357   | 484  | 0     | 0     | 659  | 0    |    |
| Turn Type               | Perm  | NA    | pm+ov | Perm  | NA    |      | D,P+P | NA   |       | Perm  | NA   |      |    |
| Protected Phases        |       | 4     | 1     |       | 4     |      | 1     | 12   |       | 2     |      | 3    |    |
| Permitted Phases        | 4     |       | 4     |       | 4     |      | 2     |      |       | 2     |      |      |    |
| Detector Phase          | 4     | 4     | 1     | 4     | 4     |      | 1     | 12   |       | 2     | 2    |      |    |
| Switch Phase            |       |       |       |       |       |      |       |      |       |       |      |      |    |
| Minimum Initial (s)     | 9.0   | 9.0   | 7.0   | 9.0   | 9.0   |      | 7.0   |      | 6.0   | 6.0   |      | 4.0  |    |
| Minimum Split (s)       | 14.0  | 14.0  | 12.0  | 14.0  | 14.0  |      | 12.0  |      | 11.0  | 11.0  |      | 19.0 |    |
| Total Split (s)         | 19.0  | 19.0  | 25.0  | 19.0  | 19.0  |      | 25.0  |      | 45.0  | 45.0  |      | 19.0 |    |
| Total Split (%)         | 17.6% | 17.6% | 23.1% | 17.6% | 17.6% |      | 23.1% |      | 41.7% | 41.7% |      | 18%  |    |
| Yellow Time (s)         | 4.0   | 4.0   | 4.0   | 4.0   | 4.0   |      | 4.0   |      | 4.0   | 4.0   |      | 4.0  |    |
| All-Red Time (s)        | 1.0   | 1.0   | 1.0   | 1.0   | 1.0   |      | 1.0   |      | 1.0   | 1.0   |      | 0.0  |    |
| Lost Time Adjust (s)    | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   |      | 0.0   |      | 0.0   | 0.0   |      | 0.0  |    |
| Total Lost Time (s)     | 5.0   | 5.0   |       | 5.0   | 5.0   |      | 5.0   |      | 5.0   | 5.0   |      | 4.0  |    |
| Lead/Lag                | Lag   | Lag   | Lead  | Lag   | Lag   | Lead |       |      | Lag   | Lag   | Lead |      |    |
| Lead-Lag Optimize?      |       |       |       |       |       |      |       |      |       |       |      |      |    |
| Recall Mode             | Min   | Min   | Max   | Min   | Min   | Max  |       |      | Max   | Max   |      | None |    |
| Act Effct Green (s)     | 9.9   | 30.1  |       | 9.9   | 60.7  | 65.8 |       |      | 40.5  |       |      |      |    |
| Actuated g/C Ratio      | 0.10  | 0.31  |       | 0.10  | 0.63  | 0.68 |       |      | 0.42  |       |      |      |    |
| v/c Ratio               | 0.24  | 0.80  |       | 0.40  | 0.62  | 0.38 |       |      | 0.84  |       |      |      |    |
| Control Delay           | 47.4  | 44.0  |       | 50.1  | 14.7  | 9.2  |       |      | 38.9  |       |      |      |    |
| Queue Delay             | 0.0   | 0.0   |       | 0.0   | 0.0   | 0.0  |       |      | 0.0   |       |      |      |    |
| Total Delay             | 47.4  | 44.0  |       | 50.1  | 14.7  | 9.2  |       |      | 38.9  |       |      |      |    |
| LOS                     | D     | D     |       | D     | B     | A    |       |      | D     |       |      |      |    |
| Approach Delay          | 44.3  |       |       | 50.1  |       | 11.6 |       |      | 38.9  |       |      |      |    |
| Approach LOS            | D     |       |       | D     |       | B    |       |      | D     |       |      |      |    |
| Queue Length 50th (ft)  | 21    | 233   |       | 45    | 99    | 145  |       |      | 401   |       |      |      |    |
| Queue Length 95th (ft)  | 53    | #396  |       | 89    | 186   | 230  |       |      | #662  |       |      |      |    |
| Internal Link Dist (ft) | 544   |       |       | 307   |       | 428  |       |      | 451   |       |      |      |    |
| Turn Bay Length (ft)    |       | 50    |       |       | 75    |      |       |      |       |       |      |      |    |
| Base Capacity (vph)     | 200   | 499   |       | 254   | 578   | 1281 |       |      | 781   |       |      |      |    |
| Starvation Cap Reductn  | 0     | 0     |       | 0     | 0     | 0    |       |      | 0     |       |      |      |    |
| Spillback Cap Reductn   | 0     | 0     |       | 0     | 0     | 0    |       |      | 0     |       |      |      |    |
| Storage Cap Reductn     | 0     | 0     |       | 0     | 0     | 0    |       |      | 0     |       |      |      |    |
| Reduced v/c Ratio       | 0.17  | 0.80  |       | 0.28  | 0.62  | 0.38 |       |      | 0.84  |       |      |      |    |

| Intersection Summary                                            |                        |
|-----------------------------------------------------------------|------------------------|
| Area Type:                                                      | Other                  |
| Cycle Length: 108                                               |                        |
| Actuated Cycle Length: 96.3                                     |                        |
| Natural Cycle: 90                                               |                        |
| Control Type: Semi Act-Uncoord                                  |                        |
| Maximum v/c Ratio: 0.84                                         |                        |
| Intersection Signal Delay: 29.0                                 | Intersection LOS: C    |
| Intersection Capacity Utilization 80.2%                         | ICU Level of Service D |
| Analysis Period (min) 15                                        |                        |
| # 95th percentile volume exceeds capacity, queue may be longer. |                        |
| Queue shown is maximum after two cycles.                        |                        |



12239.00 :: Needham Street  
18: Nahanton Street & Winchester Street

2018 Existing Conditions  
Timing Plan: Weekday Morning

| Lane Group              | EBL   | EBT   | WBT   | WBR  | SBL   | SBR   |
|-------------------------|-------|-------|-------|------|-------|-------|
| Lane Configurations     |       |       |       |      |       |       |
| Traffic Volume (vph)    | 335   | 565   | 430   | 20   | 45    | 320   |
| Future Volume (vph)     | 335   | 565   | 430   | 20   | 45    | 320   |
| Ideal Flow (vphpl)      | 1900  | 1900  | 1900  | 1900 | 1900  | 1900  |
| Storage Length (ft)     | 175   |       |       |      | 0     | 75    |
| Storage Lanes           | 1     |       |       |      | 0     | 1     |
| Taper Length (ft)       | 25    |       |       |      | 25    |       |
| Satd. Flow (prot)       | 1805  | 1900  | 1889  | 0    | 1805  | 1615  |
| Flt Permitted           | 0.374 |       |       |      | 0.950 |       |
| Satd. Flow (perm)       | 711   | 1900  | 1889  | 0    | 1805  | 1615  |
| Right Turn on Red       |       |       | Yes   |      | No    |       |
| Satd. Flow (RTOR)       |       |       | 3     |      |       |       |
| Link Speed (mph)        |       | 30    | 30    |      | 30    |       |
| Link Distance (ft)      |       | 963   | 734   |      | 889   |       |
| Travel Time (s)         |       | 21.9  | 16.7  |      | 20.2  |       |
| Peak Hour Factor        | 0.93  | 0.93  | 0.98  | 0.98 | 0.98  | 0.98  |
| Heavy Vehicles (%)      | 0%    | 0%    | 0%    | 0%   | 0%    | 0%    |
| Shared Lane Traffic (%) |       |       |       |      |       |       |
| Lane Group Flow (vph)   | 360   | 608   | 459   | 0    | 46    | 327   |
| Turn Type               | pm+pt | NA    | NA    |      | Prot  | pt+ov |
| Protected Phases        | 5     | 2     | 6     |      | 8     | 5 8   |
| Permitted Phases        | 2     |       |       |      |       |       |
| Detector Phase          | 5     | 2     | 6     |      | 8     | 5 8   |
| Switch Phase            |       |       |       |      |       |       |
| Minimum Initial (s)     | 6.0   | 10.0  | 10.0  |      | 6.0   |       |
| Minimum Split (s)       | 11.0  | 15.0  | 23.0  |      | 10.0  |       |
| Total Split (s)         | 33.0  | 104.0 | 71.0  |      | 16.0  |       |
| Total Split (%)         | 27.5% | 86.7% | 59.2% |      | 13.3% |       |
| Yellow Time (s)         | 3.0   | 3.0   | 3.0   |      | 3.0   |       |
| All-Red Time (s)        | 2.0   | 2.0   | 2.0   |      | 1.0   |       |
| Lost Time Adjust (s)    | 0.0   | 0.0   | 0.0   |      | 0.0   |       |
| Total Lost Time (s)     | 5.0   | 5.0   | 5.0   |      | 4.0   |       |
| Lead/Lag                | Lead  |       | Lag   |      |       |       |
| Lead-Lag Optimize?      | Yes   |       | Yes   |      |       |       |
| Recall Mode             | None  | C-Min | None  |      | None  |       |
| Act Effct Green (s)     | 86.8  | 86.8  | 67.2  |      | 24.2  | 42.8  |
| Actuated g/C Ratio      | 0.72  | 0.72  | 0.56  |      | 0.20  | 0.36  |
| v/c Ratio               | 0.56  | 0.44  | 0.43  |      | 0.13  | 0.57  |
| Control Delay           | 9.8   | 8.5   | 18.6  |      | 38.2  | 34.0  |
| Queue Delay             | 0.0   | 0.0   | 0.0   |      | 0.0   | 0.0   |
| Total Delay             | 9.8   | 8.5   | 18.6  |      | 38.2  | 34.0  |
| LOS                     | A     | A     | B     |      | D     | C     |
| Approach Delay          | 9.0   | 18.6  |       |      | 34.6  |       |
| Approach LOS            | A     | B     |       |      | C     |       |
| Queue Length 50th (ft)  | 86    | 172   | 194   |      | 29    | 204   |
| Queue Length 95th (ft)  | 149   | 282   | 347   |      | 59    | 249   |
| Internal Link Dist (ft) |       | 883   | 654   |      | 809   |       |
| Turn Bay Length (ft)    | 175   |       |       |      | 75    |       |
| Base Capacity (vph)     | 769   | 1567  | 1105  |      | 363   | 756   |
| Starvation Cap Reductn  | 0     | 0     | 0     |      | 0     | 0     |
| Spillback Cap Reductn   | 0     | 0     | 0     |      | 0     | 0     |
| Storage Cap Reductn     | 0     | 0     | 0     |      | 0     | 0     |
| Reduced v/c Ratio       | 0.47  | 0.39  | 0.42  |      | 0.13  | 0.43  |

| Intersection Summary                                       |                        |  |
|------------------------------------------------------------|------------------------|--|
| Area Type:                                                 | Other                  |  |
| Cycle Length: 120                                          |                        |  |
| Actuated Cycle Length: 120                                 |                        |  |
| Offset: 8 (7%), Referenced to phase 2:EBTL, Start of Green |                        |  |
| Natural Cycle: 45                                          |                        |  |
| Control Type: Actuated-Coordinated                         |                        |  |
| Maximum v/c Ratio: 0.57                                    |                        |  |
| Intersection Signal Delay: 16.7                            | Intersection LOS: B    |  |
| Intersection Capacity Utilization 59.1%                    | ICU Level of Service B |  |
| Analysis Period (min) 15                                   |                        |  |



12239.00 :: Needham Street  
19: Wells Avenue/JCC Driveway & Nahanton Street

2018 Existing Conditions  
Timing Plan: Weekday Morning

| Lane Group               | EBL   | EBT   | EBR   | WBL   | WBT   | WBR  | NBL   | NBT   | NBR  | SBL   | SBT   | SBR  |
|--------------------------|-------|-------|-------|-------|-------|------|-------|-------|------|-------|-------|------|
| Lane Configurations      |       |       |       |       |       |      |       |       |      |       |       |      |
| Traffic Volume (vph)     | 45    | 470   | 105   | 145   | 545   | 60   | 410   | 20    | 315  | 115   | 2     | 60   |
| Future Volume (vph)      | 45    | 470   | 105   | 145   | 545   | 60   | 410   | 20    | 315  | 115   | 2     | 60   |
| Ideal Flow (vphpl)       | 1900  | 1900  | 1900  | 1900  | 1900  | 1900 | 1900  | 1900  | 1900 | 1900  | 1900  | 1900 |
| Storage Length (ft)      | 125   |       | 125   | 150   |       | 0    | 0     |       | 0    | 75    |       | 0    |
| Storage Lanes            | 1     |       | 1     |       |       | 0    | 1     |       | 0    | 1     |       | 0    |
| Taper Length (ft)        | 25    |       | 25    |       |       |      | 25    |       |      | 25    |       |      |
| Satd. Flow (prot)        | 1787  | 1881  | 1599  | 1805  | 1868  | 0    | 1805  | 1632  | 0    | 1805  | 1624  | 0    |
| Flt Permitted            | 0.132 |       |       | 0.239 |       |      | 0.716 |       |      | 0.395 |       |      |
| Satd. Flow (perm)        | 248   | 1881  | 1565  | 454   | 1868  | 0    | 1360  | 1632  | 0    | 750   | 1624  | 0    |
| Right Turn on Red        |       |       | Yes   |       |       | Yes  |       |       | Yes  |       | Yes   |      |
| Satd. Flow (RTOR)        |       |       | 75    |       | 6     |      |       | 350   |      |       | 61    |      |
| Link Speed (mph)         |       | 30    |       |       | 30    |      |       | 30    |      |       | 30    |      |
| Link Distance (ft)       |       | 797   |       |       | 963   |      |       | 598   |      |       | 628   |      |
| Travel Time (s)          |       | 18.1  |       |       | 21.9  |      |       | 13.6  |      |       | 14.3  |      |
| Confl. Peds. (#/hr)      | 1     |       | 1     | 1     |       | 1    |       |       |      |       |       |      |
| Peak Hour Factor         | 0.96  | 0.96  | 0.96  | 0.98  | 0.98  | 0.98 | 0.90  | 0.90  | 0.90 | 0.99  | 0.99  | 0.99 |
| Heavy Vehicles (%)       | 1%    | 1%    | 1%    | 0%    | 0%    | 0%   | 0%    | 0%    | 0%   | 0%    | 0%    | 0%   |
| Shared Lane Traffic (%)  |       |       |       |       |       |      |       |       |      |       |       |      |
| Lane Group Flow (vph)    | 47    | 490   | 109   | 148   | 617   | 0    | 456   | 372   | 0    | 116   | 63    | 0    |
| Turn Type                | pm+pt | NA    | Perm  | pm+pt | NA    | Perm | NA    | Perm  | NA   | Perm  | NA    |      |
| Protected Phases         | 3     | 1     |       | 3     | 1     |      |       | 2     |      |       | 2     |      |
| Permitted Phases         | 1     |       | 1     | 1     |       |      | 2     |       |      | 2     |       |      |
| Detector Phase           | 3     | 1     | 1     | 3     | 1     |      | 2     | 2     |      | 2     | 2     |      |
| Switch Phase             |       |       |       |       |       |      |       |       |      |       |       |      |
| Minimum Initial (s)      | 6.0   | 6.0   | 6.0   | 6.0   | 6.0   |      | 6.0   | 6.0   |      | 6.0   | 6.0   |      |
| Minimum Split (s)        | 10.0  | 11.0  | 11.0  | 10.0  | 11.0  |      | 11.0  | 11.0  |      | 11.0  | 11.0  |      |
| Total Split (s)          | 14.0  | 35.0  | 35.0  | 14.0  | 35.0  |      | 45.0  | 45.0  |      | 45.0  | 45.0  |      |
| Total Split (%)          | 14.9% | 37.2% | 37.2% | 14.9% | 37.2% |      | 47.9% | 47.9% |      | 47.9% | 47.9% |      |
| Yellow Time (s)          | 3.0   | 3.0   | 3.0   | 3.0   | 3.0   |      | 3.0   | 3.0   |      | 3.0   | 3.0   |      |
| All-Red Time (s)         | 1.0   | 2.0   | 2.0   | 1.0   | 2.0   |      | 2.0   | 2.0   |      | 2.0   | 2.0   |      |
| Lost Time Adjust (s)     | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   |      | 0.0   | 0.0   |      | 0.0   | 0.0   |      |
| Total Lost Time (s)      | 4.0   | 5.0   | 5.0   | 4.0   | 5.0   |      | 5.0   | 5.0   |      | 5.0   | 5.0   |      |
| Lead/Lag                 |       | Lead  | Lead  |       | Lead  |      | Lag   | Lag   |      | Lag   | Lag   |      |
| Lead-Lag Optimize?       |       |       |       |       |       |      |       |       |      |       |       |      |
| Recall Mode              | None  | None  | None  | None  | None  |      | None  | None  |      | None  | None  |      |
| Act Effct Green (s)      | 39.6  | 30.4  | 30.4  | 39.6  | 30.4  |      | 32.4  | 32.4  |      | 32.4  | 32.4  |      |
| Actuated g/C Ratio       | 0.46  | 0.36  | 0.36  | 0.46  | 0.36  |      | 0.38  | 0.38  |      | 0.38  | 0.38  |      |
| v/c Ratio                | 0.18  | 0.73  | 0.18  | 0.44  | 0.92  |      | 0.88  | 0.44  |      | 0.41  | 0.10  |      |
| Control Delay            | 14.3  | 34.0  | 10.1  | 17.1  | 50.0  |      | 44.3  | 4.4   |      | 23.9  | 5.2   |      |
| Queue Delay              | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   |      | 0.0   | 0.0   |      | 0.0   | 0.0   |      |
| Total Delay              | 14.3  | 34.0  | 10.1  | 17.1  | 50.0  |      | 44.3  | 4.4   |      | 23.9  | 5.2   |      |
| LOS                      | B     | C     | B     | B     | D     |      | D     | A     |      | C     | A     |      |
| Approach Delay           |       | 28.5  |       |       | 43.7  |      |       | 26.4  |      |       | 17.3  |      |
| Approach LOS             |       | C     |       |       | D     |      |       | C     |      |       | B     |      |
| Queue Length 50th (ft)   | 13    | 244   | 13    | 44    | 336   |      | 222   | 7     |      | 44    | 1     |      |
| Queue Length 95th (ft)   | 33    | #430  | 52    | 85    | #606  |      | #396  | 60    |      | 93    | 24    |      |
| Internal Link Dist. (ft) |       | 717   |       |       | 883   |      |       | 518   |      |       | 548   |      |
| Turn Bay Length (ft)     | 125   |       | 125   | 150   |       |      |       |       |      | 75    |       |      |
| Base Capacity (vph)      | 303   | 671   | 606   | 381   | 670   |      | 646   | 959   |      | 356   | 804   |      |
| Starvation Cap Reductn   | 0     | 0     | 0     | 0     | 0     |      | 0     | 0     |      | 0     | 0     |      |
| Spillback Cap Reductn    | 0     | 0     | 0     | 0     | 0     |      | 0     | 0     |      | 0     | 0     |      |
| Storage Cap Reductn      | 0     | 0     | 0     | 0     | 0     |      | 0     | 0     |      | 0     | 0     |      |
| Reduced v/c Ratio        | 0.16  | 0.73  | 0.18  | 0.39  | 0.92  |      | 0.71  | 0.39  |      | 0.33  | 0.08  |      |

| Intersection Summary                                            |                        |
|-----------------------------------------------------------------|------------------------|
| Area Type:                                                      | Other                  |
| Cycle Length: 94                                                |                        |
| Actuated Cycle Length: 85.2                                     |                        |
| Natural Cycle: 80                                               |                        |
| Control Type: Actuated-Uncoordinated                            |                        |
| Maximum v/c Ratio: 0.92                                         |                        |
| Intersection Signal Delay: 31.8                                 | Intersection LOS: C    |
| Intersection Capacity Utilization 80.9%                         | ICU Level of Service D |
| Analysis Period (min): 15                                       |                        |
| # 95th percentile volume exceeds capacity, queue may be longer. |                        |
| Queue shown is maximum after two cycles.                        |                        |

Splits and Phases: 19: Wells Avenue/JCC Driveway & Nahanton Street



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Lanes, Volumes, Timings  
06/01/2018

12239.00 :: Needham Street  
20: Highland Avenue & Riverside Street

2018 Existing Conditions  
Timing Plan: Weekday Morning

| Intersection             |      |      |      |      |      |      |
|--------------------------|------|------|------|------|------|------|
| Int Delay, s/veh         | 0.3  |      |      |      |      |      |
| Movement                 | NWL  | NWR  | NET  | NER  | SWL  | SWT  |
| Lane Configurations      |      |      |      |      |      |      |
| Traffic Vol, veh/h       | 5    | 5    | 725  | 5    | 1    | 880  |
| Future Vol, veh/h        | 5    | 5    | 725  | 5    | 1    | 880  |
| Conflicting Peds, #/hr   | 0    | 0    | 0    | 3    | 3    | 0    |
| Sign Control             | Stop | Stop | Free | Free | Free | Free |
| RT Channelized           | -    | None | -    | None | -    | None |
| Storage Length           | 0    | -    | -    | -    | -    | -    |
| Veh in Median Storage, # | 0    | -    | 0    | -    | -    | -    |
| Grade, %                 | 0    | -    | 0    | -    | -    | 0    |
| Peak Hour Factor         | 56   | 56   | 97   | 97   | 94   | 94   |
| Heavy Vehicles, %        | 0    | 0    | 0    | 0    | 0    | 0    |
| Mvmt Flow                | 9    | 9    | 747  | 5    | 1    | 936  |

| Major/Minor          | Minor1 | Major1 | Major2 |     |
|----------------------|--------|--------|--------|-----|
| Conflicting Flow All | 1691   | 753    | 0      | 756 |
| Stage 1              | 753    | -      | -      | -   |
| Stage 2              | 938    | -      | -      | -   |
| Critical Hdwy        | 6.4    | 6.2    | -      | 4.1 |
| Critical Hdwy Stg 1  | 5.4    | -      | -      | -   |
| Critical Hdwy Stg 2  | 5.4    | -      | -      | -   |
| Follow-up Hdwy       | 3.5    | 3.3    | -      | 2.2 |
| Pot Cap-1 Maneuver   | 104    | 413    | -      | 864 |
| Stage 1              | 469    | -      | -      | -   |
| Stage 2              | 384    | -      | -      | -   |
| Platoon blocked, %   |        | -      | -      | -   |
| Mov Cap-1 Maneuver   | 104    | 412    | -      | 864 |
| Mov Cap-2 Maneuver   | 104    | -      | -      | -   |
| Stage 1              | 468    | -      | -      | -   |
| Stage 2              | 383    | -      | -      | -   |

| Approach             | NW   | NE | SW |
|----------------------|------|----|----|
| HCM Control Delay, s | 29.3 | 0  | 0  |
| HCM LOS              | D    |    |    |

| Minor Lane/Major Mvmt | NET | NER | NWLn1 | SWL   | SWT |
|-----------------------|-----|-----|-------|-------|-----|
| Capacity (veh/h)      | -   | -   | 166   | 864   | -   |
| HCM Lane V/C Ratio    | -   | -   | 0.108 | 0.001 | -   |
| HCM Control Delay (s) | -   | -   | 29.3  | 9.2   | 0   |
| HCM Lane LOS          | -   | -   | D     | A     | A   |
| HCM 95th %ile Q(veh)  | -   | -   | 0.4   | 0     | -   |

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HCM 2010 TWSC  
06/01/2018

2018 Existing Conditions  
Timing Plan: Weekday Morning

| Minor Lane/Major Mvmt  | NEL   | NET | NER | NWLn1 | SELn1 | SWL   | SWT | SWR |
|------------------------|-------|-----|-----|-------|-------|-------|-----|-----|
| Capacity (veh/h)       | 730   | -   | -   | 81    | 165   | 871   | -   | -   |
| HCM Lane V/C Ratio     | 0.014 | -   | -   | 0.173 | 0.253 | 0.006 | -   | -   |
| HCM Control Delay (s)  | 10    | 0   | -   | 58.5  | 34    | 9.2   | 0   | -   |
| HCM Lane LOS           | B     | A   | -   | F     | D     | A     | A   | -   |
| HCM 95th %tile Q (veh) | 0     | -   | -   | 0.6   | 1     | 0     | -   | -   |

HCM 2010 TWSC  
06/01/2018

2018 Existing Conditions  
Timing Plan: Weekday Morning

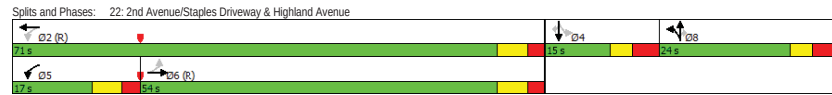
| Lane Group              | EBL   | EBT   | EBR   | WBL   | WBT   | WBR   | NBL   | NBT   | NBR   | SBL   | SBT   | SBR   |
|-------------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| Lane Configurations     |       | ↔↔    |       |       | ↔↔    |       |       | ↔     |       |       | ↔     | ↔     |
| Traffic Volume (vph)    | 10    | 540   | 95    | 135   | 710   | 45    | 705   | 20    | 135   | 60    | 20    | 25    |
| Future Volume (vph)     | 10    | 540   | 95    | 135   | 710   | 45    | 705   | 20    | 135   | 60    | 20    | 25    |
| Ideal Flow (vphpl)      | 1900  | 1900  | 1900  | 1900  | 1900  | 1900  | 1900  | 1900  | 1900  | 1900  | 1900  | 1900  |
| Storage Length (ft)     | 0     | 0     | 0     | 0     | 0     | 100   | 150   | 100   | 100   | 0     | 0     | 50    |
| Storage Lengths         | 0     | 0     | 0     | 0     | 0     | 1     | 1     | 1     | 1     | 0     | 0     | 1     |
| Taper Length (ft)       | 25    |       |       | 25    |       |       | 25    |       |       | 25    |       |       |
| Satd. Flow (prot)       | 0     | 3515  | 0     | 0     | 3548  | 0     | 1715  | 1724  | 1615  | 0     | 1832  | 1615  |
| Flt Permitted           |       | 0.934 |       |       | 0.662 |       | 0.950 | 0.955 |       |       | 0.273 |       |
| Satd. Flow (perm)       | 0     | 3286  | 0     | 0     | 2367  | 0     | 1708  | 1718  | 1579  | 0     | 518   | 1577  |
| Right Turn on Red       |       |       | Yes   |       |       | Yes   |       |       |       |       |       | Yes   |
| Satd. Flow (RTOR)       |       | 22    |       |       | 8     |       |       |       | 164   |       |       | 164   |
| Link Speed (mph)        |       | 30    |       |       | 30    |       |       | 30    |       |       | 30    |       |
| Link Distance (ft)      |       | 210   |       |       | 361   |       |       | 859   |       |       | 290   |       |
| Travel Time (s)         |       | 4.8   |       |       | 8.2   |       |       | 19.5  |       |       | 6.6   |       |
| Contd. Peds. (#/hr)     | 2     |       | 2     | 2     |       | 2     | 3     |       | 1     | 1     |       | 3     |
| Peak Hour Factor        | 0.88  | 0.88  | 0.88  | 0.87  | 0.87  | 0.87  | 0.86  | 0.86  | 0.86  | 0.70  | 0.70  | 0.70  |
| Heavy Vehicles (%)      | 0%    | 0%    | 0%    | 0%    | 0%    | 0%    | 0%    | 0%    | 0%    | 0%    | 0%    | 0%    |
| Shared Lane Traffic (%) |       |       |       |       |       |       | 49%   |       |       |       |       |       |
| Lane Group Flow (vph)   | 0     | 733   | 0     | 0     | 1023  | 0     | 418   | 425   | 157   | 0     | 115   | 36    |
| Turn Type               | Perm  | NA    |       | pm+pt |       |       | Split | NA    | Perm  | Perm  | NA    | Perm  |
| Protected Phases        |       | 6     |       | 5     | 2     |       | 8     | 8     |       |       | 4     |       |
| Permitted Phases        |       | 6     |       | 2     |       |       |       |       | 8     | 4     |       | 4     |
| Detector Phase          |       | 6     | 6     | 5     | 2     |       | 8     | 8     | 8     | 4     | 4     | 4     |
| Switch Phase            |       |       |       |       |       |       |       |       |       |       |       |       |
| Minimum Initial (s)     |       | 15.0  | 15.0  |       | 4.0   | 15.0  | 10.0  | 10.0  | 10.0  | 4.0   | 4.0   | 4.0   |
| Minimum Split (s)       |       | 38.5  | 38.5  |       | 10.5  | 31.5  | 29.5  | 29.5  | 29.5  | 10.5  | 10.5  | 10.5  |
| Total Split (s)         |       | 54.0  | 54.0  |       | 17.0  | 71.0  | 24.0  | 24.0  | 24.0  | 15.0  | 15.0  | 15.0  |
| Total Split (%)         | 49.1% | 49.1% |       | 15.5% | 64.5% |       | 21.8% | 21.8% | 21.8% | 13.6% | 13.6% | 13.6% |
| Yellow Time (s)         |       | 4.0   | 4.0   |       | 4.0   | 4.0   | 3.0   | 3.0   | 3.0   | 3.0   | 3.0   | 3.0   |
| All-Red Time (s)        |       | 2.5   | 2.5   |       | 2.5   | 2.5   | 3.5   | 3.5   | 3.5   | 3.5   | 3.5   | 3.5   |
| Lost Time Adjust (s)    |       | 0.0   | 0.0   |       | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   |
| Total Lost Time (s)     |       |       | 6.5   |       |       | 6.5   | 6.5   | 6.5   | 6.5   |       | 6.5   | 6.5   |
| Lead/Lag                |       | Lag   |       |       | Lead  |       |       |       |       |       |       |       |
| Lead-Lag Optimize?      |       | Yes   |       |       | Yes   |       |       |       |       |       |       |       |
| Recall Mode             |       | C-Min | C-Min |       | None  | C-Min | None  | None  | None  | None  | None  | None  |
| Act Effct Green (s)     |       | 60.2  |       |       | 60.2  |       | 17.5  | 17.5  | 17.5  |       | 12.8  | 12.8  |
| Adjusted v/c Ratio      |       | 0.55  |       |       | 0.55  |       | 0.16  | 0.16  | 0.16  |       | 0.12  | 0.12  |
| v/c Ratio               |       | 0.41  |       |       | 0.79  |       | 1.54  | 1.55  | 0.40  |       | 1.92  | 0.11  |
| Control Delay           |       | 14.3  |       |       | 24.3  |       | 292.4 | 298.2 | 9.1   |       | 499.4 | 0.7   |
| Queue Delay             |       | 0.0   |       |       | 0.0   |       | 0.0   | 0.0   | 0.0   |       | 0.0   | 0.0   |
| Total Delay             |       | 14.3  |       |       | 24.3  |       | 292.4 | 298.2 | 9.1   |       | 499.4 | 0.7   |
| LOS                     |       | B     |       |       | C     |       | F     | F     | A     |       | F     | A     |
| Approach Delay          |       | 14.3  |       |       | 24.3  |       |       | 250.4 |       |       | 380.5 |       |
| Approach LOS            |       | B     |       |       | C     |       |       | F     |       |       | F     |       |
| Queue Length 50th (ft)  |       | 136   |       |       | 267   |       | ~436  | ~446  | 0     |       | ~135  | 0     |
| Queue Length 95th (ft)  |       | 165   |       |       | 321   |       | #602  | #612  | 46    |       | #193  | 0     |
| Internal Link Dist (ft) |       | 130   |       |       | 281   |       |       | 779   |       |       | 210   |       |
| Turn Bay Length (ft)    |       |       |       |       |       |       | 150   |       | 100   |       |       | 50    |
| Base Capacity (vph)     | 1808  |       |       |       | 1391  |       | 272   | 274   | 389   | 60    | 328   |       |
| Starvation Cap Reductn  | 0     |       |       | 0     | 0     |       | 0     | 0     | 0     |       | 0     | 0     |
| Spillback Cap Reductn   | 0     |       |       | 0     | 0     |       | 0     | 0     | 0     |       | 0     | 0     |
| Storage Cap Reductn     | 0     |       |       | 0     | 0     |       | 0     | 0     | 0     |       | 0     | 0     |
| Reduced v/c Ratio       | 0.41  |       |       | 0.74  |       |       | 1.54  | 1.55  | 0.40  |       | 1.92  | 0.11  |

|                                    |                                                                                   |
|------------------------------------|-----------------------------------------------------------------------------------|
| Area Type:                         | Other                                                                             |
| Cycle Length:                      | 110                                                                               |
| Actuated Cycle Length:             | 110                                                                               |
| Offset:                            | 0 (0%) Referenced to phase 2 WBTL and 6 EBTL, Start of Green, Master Intersection |
| Natural Cycle:                     | 90                                                                                |
| Control Type:                      | Actuated-Coordinated                                                              |
| Maximum v/c Ratio:                 | 1.92                                                                              |
| Intersection Signal Delay:         | 118.1                                                                             |
| Intersection Capacity Utilization: | 94.6%                                                                             |
| Analysis Period (min):             | 15                                                                                |
| -                                  | Volume exceeds capacity, queue is theoretically infinite.                         |
| -                                  | Queue shown is maximum after two cycles.                                          |
| #                                  | 95th percentile volume exceeds capacity, queue may be longer.                     |
| -                                  | Queue shown is maximum after two cycles.                                          |

Lanes, Volumes, Timing:  
06/01/2011

12239.00 :: Needham Street  
 22: 2nd Avenue/Staples Driveway & Highland Avenue

2018 Existing Conditions  
 Timing Plan: Weekday Morning



12239.00 :: Needham Street  
 23: Highland Avenue & Charles Street

2018 Existing Conditions  
 Timing Plan: Weekday Morning

| Intersection             |        |        |      |        |       |      |
|--------------------------|--------|--------|------|--------|-------|------|
| Int Delay, s/veh         | 5      |        |      |        |       |      |
| Movement                 | EBL    | EBT    | WBT  | WBR    | SBL   | SBR  |
| Lane Configurations      |        | ↕↕     | ↕↕   |        | ↕     | ↕    |
| Traffic Vol, veh/h       | 65     | 625    | 1425 | 15     | 20    | 110  |
| Future Vol, veh/h        | 65     | 625    | 1425 | 15     | 20    | 110  |
| Conflicting Peds, #/hr   | 4      | 0      | 0    | 4      | 0     | 0    |
| Sign Control             | Free   | Free   | Free | Free   | Stop  | Stop |
| RT Channelized           | -      | None   | -    | None   | -     | None |
| Storage Length           | -      | -      | -    | -      | 0     | -    |
| Veh in Median Storage, # | -      | 0      | 0    | -      | 0     | -    |
| Grade, %                 | -      | 0      | 0    | -      | 0     | -    |
| Peak Hour Factor         | 98     | 98     | 97   | 97     | 97    | 97   |
| Heavy Vehicles, %        | 1      | 1      | 0    | 0      | 0     | 0    |
| Mvmt Flow                | 66     | 638    | 1469 | 15     | 21    | 113  |
|                          |        |        |      |        |       |      |
| Major/Minor              | Major1 | Major2 |      | Minor2 |       |      |
| Conflicting Flow All     | 1489   | 0      | -    | 0      | 1933  | 746  |
| Stage 1                  | -      | -      | -    | -      | 1481  | -    |
| Stage 2                  | -      | -      | -    | -      | 452   | -    |
| Critical Hdwy            | 4.12   | -      | -    | -      | 6.8   | 6.9  |
| Critical Hdwy Stg 1      | -      | -      | -    | -      | 5.8   | -    |
| Critical Hdwy Stg 2      | -      | -      | -    | -      | 5.8   | -    |
| Follow-up Hdwy           | 2.21   | -      | -    | -      | 3.5   | 3.3  |
| Pot Cap-1 Maneuver       | 452    | -      | -    | -      | 59    | 360  |
| Stage 1                  | -      | -      | -    | -      | 179   | -    |
| Stage 2                  | -      | -      | -    | -      | 614   | -    |
| Platoon blocked, %       | -      | -      | -    | -      | -     | -    |
| Mov Cap-1 Maneuver       | 452    | -      | -    | -      | 45    | 359  |
| Mov Cap-2 Maneuver       | -      | -      | -    | -      | 45    | -    |
| Stage 1                  | -      | -      | -    | -      | 178   | -    |
| Stage 2                  | -      | -      | -    | -      | 474   | -    |
|                          |        |        |      |        |       |      |
| Approach                 | EB     | WB     |      | SB     |       |      |
| HCM Control Delay, s     | 2.5    | 0      |      | 74.2   |       |      |
| HCM LOS                  |        |        |      | F      |       |      |
|                          |        |        |      |        |       |      |
| Minor Lane/Major Mvmt    | EBL    | EBT    | WBT  | WBR    | SBLn1 |      |
| Capacity (veh/h)         | 452    | -      | -    | -      | 173   |      |
| HCM Lane V/C Ratio       | 0.147  | -      | -    | -      | 0.775 |      |
| HCM Control Delay (s)    | 14.3   | 1.3    | -    | -      | 74.2  |      |
| HCM Lane LOS             | B      | A      | -    | -      | F     |      |
| HCM 95th %ile Q(veh)     | 0.5    | -      | -    | -      | 5.1   |      |

12239.00 :: Needham Street  
24: Highland Avenue & Wexford Street

2018 Existing Conditions  
Timing Plan: Weekday Morning

| Intersection             |        |        |      |        |       |      |
|--------------------------|--------|--------|------|--------|-------|------|
| Int Delay, s/veh         | 29.2   |        |      |        |       |      |
| Movement                 | EBL    | EBT    | WBT  | WBR    | SBL   | SBR  |
| Lane Configurations      |        | ↕↕     | ↕↕   |        | ↕     |      |
| Traffic Vol, veh/h       | 110    | 665    | 1425 | 25     | 25    | 205  |
| Future Vol, veh/h        | 110    | 665    | 1425 | 25     | 25    | 205  |
| Conflicting Peds, #/hr   | 5      | 0      | 0    | 5      | 0     | 0    |
| Sign Control             | Free   | Free   | Free | Free   | Stop  | Stop |
| RT Channelized           | -      | None   | -    | None   | -     | None |
| Storage Length           | -      | -      | -    | -      | 0     | -    |
| Veh in Median Storage, # | -      | 0      | 0    | -      | 0     | -    |
| Grade, %                 | -      | 0      | 0    | -      | 0     | -    |
| Peak Hour Factor         | 99     | 99     | 97   | 97     | 96    | 96   |
| Heavy Vehicles, %        | 0      | 0      | 0    | 0      | 0     | 0    |
| Mvmt Flow                | 111    | 672    | 1469 | 26     | 26    | 214  |
| Major/Minor              | Major1 | Major2 |      | Minor2 |       |      |
| Conflicting Flow All     | 1500   | 0      | -    | 0      | 2045  | 752  |
| Stage 1                  | -      | -      | -    | -      | 1487  | -    |
| Stage 2                  | -      | -      | -    | -      | 558   | -    |
| Critical Hdwy            | 4.1    | -      | -    | -      | 6.8   | 6.9  |
| Critical Hdwy Stg 1      | -      | -      | -    | -      | 5.8   | -    |
| Critical Hdwy Stg 2      | -      | -      | -    | -      | 5.8   | -    |
| Follow-up Hdwy           | 2.2    | -      | -    | -      | 3.5   | 3.3  |
| Pot Cap-1 Maneuver       | 453    | -      | -    | -      | 50    | 357  |
| Stage 1                  | -      | -      | -    | -      | 177   | -    |
| Stage 2                  | -      | -      | -    | -      | 542   | -    |
| Platoon blocked, %       | -      | -      | -    | -      | -     | -    |
| Mov Cap-1 Maneuver       | 453    | -      | -    | -      | 30    | 356  |
| Mov Cap-2 Maneuver       | -      | -      | -    | -      | 30    | -    |
| Stage 1                  | -      | -      | -    | -      | 176   | -    |
| Stage 2                  | -      | -      | -    | -      | 329   | -    |
| Approach                 | EB     | WB     |      | SB     |       |      |
| HCM Control Delay, s     | 4.2    | 0      |      | 293.4  |       |      |
| HCM LOS                  |        |        |      | F      |       |      |
| Minor Lane/Major Mvmt    | EBL    | EBT    | WBT  | WBR    | SBLn1 |      |
| Capacity (veh/h)         | 453    | -      | -    | -      | 163   |      |
| HCM Lane V/C Ratio       | 0.245  | -      | -    | -      | 1.47  |      |
| HCM Control Delay (s)    | 15.5   | 2.3    | -    | -      | 293.4 |      |
| HCM Lane LOS             | C      | A      | -    | -      | F     |      |
| HCM 95th %ile Q(veh)     | 1      | -      | -    | -      | 15.4  |      |

12239.00 :: Needham Street  
25: 1st Avenue/Riverside Community Care Driveway & Highland Avenue

2018 Existing Conditions  
Timing Plan: Weekday Morning

| Intersection             |        |        |      |        |      |        |       |      |      |      |      |      |
|--------------------------|--------|--------|------|--------|------|--------|-------|------|------|------|------|------|
| Int Delay, s/veh         | 0.7    |        |      |        |      |        |       |      |      |      |      |      |
| Movement                 | EBL    | EBT    | EBR  | WBL    | WBT  | WBR    | NBL   | NBT  | NBR  | SBL  | SBT  | SBR  |
| Lane Configurations      |        | ↕↕     | ↕    |        | ↕↕   |        |       |      |      |      |      | ↕    |
| Traffic Vol, veh/h       | 0      | 730    | 150  | 5      | 1615 | 15     | 0     | 0    | 85   | 0    | 0    | 20   |
| Future Vol, veh/h        | 0      | 730    | 150  | 5      | 1615 | 15     | 0     | 0    | 85   | 0    | 0    | 20   |
| Conflicting Peds, #/hr   | 0      | 0      | 1    | 1      | 0    | 0      | 0     | 0    | 2    | 2    | 0    | 0    |
| Sign Control             | Free   | Free   | Free | Free   | Free | Free   | Stop  | Stop | Stop | Stop | Stop | Stop |
| RT Channelized           | -      | -      | None | -      | -    | None   | -     | -    | None | -    | -    | None |
| Storage Length           | -      | -      | 200  | -      | -    | -      | -     | -    | 0    | -    | -    | 0    |
| Veh in Median Storage, # | -      | 0      | -    | -      | 0    | -      | -     | 0    | -    | -    | 0    | -    |
| Grade, %                 | -      | 0      | -    | -      | 0    | -      | -     | 0    | -    | -    | 0    | -    |
| Peak Hour Factor         | 91     | 91     | 91   | 93     | 93   | 93     | 68    | 68   | 68   | 75   | 75   | 75   |
| Heavy Vehicles, %        | 0      | 0      | 0    | 0      | 0    | 0      | 1     | 1    | 1    | 0    | 0    | 0    |
| Mvmt Flow                | 0      | 802    | 165  | 5      | 1737 | 16     | 0     | 0    | 125  | 0    | 0    | 27   |
| Major/Minor              | Major1 | Major2 |      | Minor1 |      | Minor2 |       |      |      |      |      |      |
| Conflicting Flow All     | -      | 0      | 0    | 803    | 0    | 0      | -     | 404  | -    | -    | 876  | -    |
| Stage 1                  | -      | -      | -    | -      | -    | -      | -     | -    | -    | -    | -    | -    |
| Stage 2                  | -      | -      | -    | -      | -    | -      | -     | -    | -    | -    | -    | -    |
| Critical Hdwy            | -      | -      | -    | 4.1    | -    | -      | -     | -    | 6.92 | -    | -    | 6.9  |
| Critical Hdwy Stg 1      | -      | -      | -    | -      | -    | -      | -     | -    | -    | -    | -    | -    |
| Critical Hdwy Stg 2      | -      | -      | -    | -      | -    | -      | -     | -    | -    | -    | -    | -    |
| Follow-up Hdwy           | -      | -      | -    | 2.2    | -    | -      | -     | -    | 3.31 | -    | -    | 3.3  |
| Pot Cap-1 Maneuver       | 0      | -      | -    | 830    | -    | -      | 0     | 0    | 599  | 0    | 0    | 296  |
| Stage 1                  | 0      | -      | -    | -      | -    | 0      | 0     | 0    | -    | 0    | 0    | -    |
| Stage 2                  | 0      | -      | -    | -      | -    | 0      | 0     | 0    | -    | 0    | 0    | -    |
| Platoon blocked, %       | -      | -      | -    | -      | -    | -      | -     | -    | -    | -    | -    | -    |
| Mov Cap-1 Maneuver       | -      | -      | -    | 829    | -    | -      | -     | -    | 598  | -    | -    | 296  |
| Mov Cap-2 Maneuver       | -      | -      | -    | -      | -    | -      | -     | -    | -    | -    | -    | -    |
| Stage 1                  | -      | -      | -    | -      | -    | -      | -     | -    | -    | -    | -    | -    |
| Stage 2                  | -      | -      | -    | -      | -    | -      | -     | -    | -    | -    | -    | -    |
| Approach                 | EB     | WB     |      | NB     |      | SB     |       |      |      |      |      |      |
| HCM Control Delay, s     | 0      | 0      |      | 12.6   |      | 18.4   |       |      |      |      |      |      |
| HCM LOS                  |        |        |      | B      |      | C      |       |      |      |      |      |      |
| Minor Lane/Major Mvmt    | NBLn1  | EBT    | EBR  | WBL    | WBT  | WBR    | SBLn1 |      |      |      |      |      |
| Capacity (veh/h)         | 598    | -      | -    | 829    | -    | -      | 296   |      |      |      |      |      |
| HCM Lane V/C Ratio       | 0.209  | -      | -    | 0.006  | -    | -      | 0.09  |      |      |      |      |      |
| HCM Control Delay (s)    | 12.6   | -      | -    | 9.4    | -    | -      | 18.4  |      |      |      |      |      |
| HCM Lane LOS             | B      | -      | -    | A      | -    | -      | C     |      |      |      |      |      |
| HCM 95th %ile Q(veh)     | 0.8    | -      | -    | 0      | -    | -      | 0.3   |      |      |      |      |      |

12239.00 :: Needham Street  
26: I-95 NB Ramps & Highland Avenue

2018 Existing Conditions  
Timing Plan: Weekday Morning

| Intersection             |        |      |       |        |      |       |        |       |       |        |      |       |
|--------------------------|--------|------|-------|--------|------|-------|--------|-------|-------|--------|------|-------|
| Int Delay, s/veh         |        |      |       |        |      |       |        |       |       |        |      |       |
| 1.2                      |        |      |       |        |      |       |        |       |       |        |      |       |
| Movement                 | EBL    | EBT  | EBR   | WBL    | WBT  | WBR   | NBL    | NBT   | NBR   | SBL    | SBT  | SBR   |
| Lane Configurations      |        | ↕↕   | ↕     |        | ↕↕   |       |        |       | ↕     |        |      | ↕     |
| Traffic Vol, veh/h       | 0      | 715  | 440   | 0      | 870  | 765   | 0      | 0     | 165   | 0      | 0    | 105   |
| Future Vol, veh/h        | 0      | 715  | 440   | 0      | 870  | 765   | 0      | 0     | 165   | 0      | 0    | 105   |
| Conflicting Peds, #/hr   | 3      | 0    | 0     | 0      | 0    | 3     | 0      | 0     | 0     | 0      | 0    | 3     |
| Sign Control             | Free   | Free | Free  | Free   | Free | Free  | Stop   | Stop  | Stop  | Stop   | Stop | Stop  |
| RT Channelized           | -      | -    | Yield | -      | -    | Yield | -      | -     | Yield | -      | -    | Yield |
| Storage Length           | -      | -    | 0     | -      | -    | -     | -      | -     | 0     | -      | -    | 0     |
| Veh in Median Storage, # | -      | 0    | -     | -      | 0    | -     | -      | 0     | -     | -      | 0    | -     |
| Grade, %                 | -      | 0    | -     | -      | 0    | -     | -      | 0     | -     | -      | 0    | -     |
| Peak Hour Factor         | 98     | 98   | 98    | 86     | 86   | 86    | 89     | 89    | 89    | 90     | 90   | 90    |
| Heavy Vehicles, %        | 1      | 1    | 1     | 1      | 1    | 1     | 2      | 2     | 2     | 2      | 2    | 2     |
| Mvmt Flow                | 0      | 730  | 449   | 0      | 1012 | 890   | 0      | 0     | 185   | 0      | 0    | 117   |
| Major/Minor              | Major1 |      |       | Major2 |      |       | Minor1 |       |       | Minor2 |      |       |
| Conflicting Flow All     | -      | 0    | 0     | -      | -    | 0     | -      | -     | 365   | -      | -    | 512   |
| Stage 1                  | -      | -    | -     | -      | -    | -     | -      | -     | -     | -      | -    | -     |
| Stage 2                  | -      | -    | -     | -      | -    | -     | -      | -     | -     | -      | -    | -     |
| Critical Hdwy            | -      | -    | -     | -      | -    | -     | -      | -     | 6.94  | -      | -    | 6.94  |
| Critical Hdwy Stg 1      | -      | -    | -     | -      | -    | -     | -      | -     | -     | -      | -    | -     |
| Critical Hdwy Stg 2      | -      | -    | -     | -      | -    | -     | -      | -     | -     | -      | -    | -     |
| Follow-up Hdwy           | -      | -    | -     | -      | -    | -     | -      | -     | 3.32  | -      | -    | 3.32  |
| Pot Cap-1 Maneuver       | 0      | -    | -     | 0      | -    | -     | 0      | 0     | 632   | 0      | 0    | 507   |
| Stage 1                  | 0      | -    | -     | 0      | -    | -     | 0      | 0     | -     | 0      | 0    | -     |
| Stage 2                  | 0      | -    | -     | 0      | -    | -     | 0      | 0     | -     | 0      | 0    | -     |
| Platoon blocked, %       | -      | -    | -     | -      | -    | -     | -      | -     | -     | -      | -    | -     |
| Mov Cap-1 Maneuver       | -      | -    | -     | -      | -    | -     | -      | -     | 632   | -      | -    | 504   |
| Mov Cap-2 Maneuver       | -      | -    | -     | -      | -    | -     | -      | -     | -     | -      | -    | -     |
| Stage 1                  | -      | -    | -     | -      | -    | -     | -      | -     | -     | -      | -    | -     |
| Stage 2                  | -      | -    | -     | -      | -    | -     | -      | -     | -     | -      | -    | -     |
| Approach                 | EB     |      |       | WB     |      |       | NB     |       |       | SB     |      |       |
| HCM Control Delay, s     | 0      |      |       | 0      |      |       | 13     |       |       | 14.3   |      |       |
| HCM LOS                  |        |      |       |        |      |       | B      |       |       | B      |      |       |
| Minor Lane/Major Mvmt    | NBLn1  |      |       | EBT    | EBR  | WBT   | WBR    | SBLn1 |       |        |      |       |
| Capacity (veh/h)         | 632    |      |       | -      | -    | -     | -      | 504   |       |        |      |       |
| HCM Lane V/C Ratio       | 0.293  |      |       | -      | -    | -     | -      | 0.231 |       |        |      |       |
| HCM Control Delay (s)    | 13     |      |       | -      | -    | -     | -      | 14.3  |       |        |      |       |
| HCM Lane LOS             | B      |      |       | -      | -    | -     | -      | B     |       |        |      |       |
| HCM 95th %ile Q(veh)     | 1.2    |      |       | -      | -    | -     | -      | 0.9   |       |        |      |       |

12239.00 :: Needham Street  
27: I-95 SB Ramps & Highland Avenue

2018 Existing Conditions  
Timing Plan: Weekday Morning

| Intersection             |        |      |       |        |      |       |        |       |       |        |      |       |
|--------------------------|--------|------|-------|--------|------|-------|--------|-------|-------|--------|------|-------|
| Int Delay, s/veh         |        |      |       |        |      |       |        |       |       |        |      |       |
| 5.5                      |        |      |       |        |      |       |        |       |       |        |      |       |
| Movement                 | EBL    | EBT  | EBR   | WBL    | WBT  | WBR   | NBL    | NBT   | NBR   | SBL    | SBT  | SBR   |
| Lane Configurations      |        | ↕↕   |       |        | ↕↕   | ↕     |        |       | ↕     |        |      | ↕     |
| Traffic Vol, veh/h       | 0      | 890  | 250   | 0      | 615  | 360   | 0      | 0     | 265   | 0      | 0    | 400   |
| Future Vol, veh/h        | 0      | 890  | 250   | 0      | 615  | 360   | 0      | 0     | 265   | 0      | 0    | 400   |
| Conflicting Peds, #/hr   | 3      | 0    | 0     | 0      | 0    | 3     | 0      | 0     | 0     | 0      | 0    | 3     |
| Sign Control             | Free   | Free | Free  | Free   | Free | Free  | Stop   | Stop  | Stop  | Stop   | Stop | Stop  |
| RT Channelized           | -      | -    | Yield | -      | -    | Yield | -      | -     | Yield | -      | -    | Yield |
| Storage Length           | -      | -    | -     | -      | -    | 0     | -      | -     | 0     | -      | -    | 0     |
| Veh in Median Storage, # | -      | 0    | -     | -      | 0    | -     | -      | 0     | -     | -      | 0    | -     |
| Grade, %                 | -      | 0    | -     | -      | 0    | -     | -      | 0     | -     | -      | 0    | -     |
| Peak Hour Factor         | 98     | 98   | 98    | 84     | 84   | 84    | 92     | 92    | 92    | 86     | 86   | 86    |
| Heavy Vehicles, %        | 1      | 1    | 1     | 1      | 1    | 1     | 2      | 2     | 2     | 0      | 0    | 0     |
| Mvmt Flow                | 0      | 908  | 255   | 0      | 732  | 429   | 0      | 0     | 288   | 0      | 0    | 465   |
| Major/Minor              | Major1 |      |       | Major2 |      |       | Minor1 |       |       | Minor2 |      |       |
| Conflicting Flow All     | -      | 0    | 0     | -      | -    | 0     | -      | -     | 454   | -      | -    | 372   |
| Stage 1                  | -      | -    | -     | -      | -    | -     | -      | -     | -     | -      | -    | -     |
| Stage 2                  | -      | -    | -     | -      | -    | -     | -      | -     | -     | -      | -    | -     |
| Critical Hdwy            | -      | -    | -     | -      | -    | -     | -      | -     | 6.94  | -      | -    | 6.9   |
| Critical Hdwy Stg 1      | -      | -    | -     | -      | -    | -     | -      | -     | -     | -      | -    | -     |
| Critical Hdwy Stg 2      | -      | -    | -     | -      | -    | -     | -      | -     | -     | -      | -    | -     |
| Follow-up Hdwy           | -      | -    | -     | -      | -    | -     | -      | -     | 3.32  | -      | -    | 3.3   |
| Pot Cap-1 Maneuver       | 0      | -    | -     | 0      | -    | -     | 0      | 0     | 553   | 0      | 0    | 631   |
| Stage 1                  | 0      | -    | -     | 0      | -    | -     | 0      | 0     | -     | 0      | 0    | -     |
| Stage 2                  | 0      | -    | -     | 0      | -    | -     | 0      | 0     | -     | 0      | 0    | -     |
| Platoon blocked, %       | -      | -    | -     | -      | -    | -     | -      | -     | -     | -      | -    | -     |
| Mov Cap-1 Maneuver       | -      | -    | -     | -      | -    | -     | -      | -     | 553   | -      | -    | 628   |
| Mov Cap-2 Maneuver       | -      | -    | -     | -      | -    | -     | -      | -     | -     | -      | -    | -     |
| Stage 1                  | -      | -    | -     | -      | -    | -     | -      | -     | -     | -      | -    | -     |
| Stage 2                  | -      | -    | -     | -      | -    | -     | -      | -     | -     | -      | -    | -     |
| Approach                 | EB     |      |       | WB     |      |       | NB     |       |       | SB     |      |       |
| HCM Control Delay, s     | 0      |      |       | 0      |      |       | 18.4   |       |       | 25.3   |      |       |
| HCM LOS                  |        |      |       |        |      |       | C      |       |       | D      |      |       |
| Minor Lane/Major Mvmt    | NBLn1  |      |       | EBT    | EBR  | WBT   | WBR    | SBLn1 |       |        |      |       |
| Capacity (veh/h)         | 553    |      |       | -      | -    | -     | -      | 628   |       |        |      |       |
| HCM Lane V/C Ratio       | 0.521  |      |       | -      | -    | -     | -      | 0.741 |       |        |      |       |
| HCM Control Delay (s)    | 18.4   |      |       | -      | -    | -     | -      | 25.3  |       |        |      |       |
| HCM Lane LOS             | C      |      |       | -      | -    | -     | -      | D     |       |        |      |       |
| HCM 95th %ile Q(veh)     | 3      |      |       | -      | -    | -     | -      | 6.5   |       |        |      |       |

12239.00 :: Needham Street  
1: Chestnut Street & Route 9 WB Access Road

2018 Existing Conditions  
Timing Plan: Saturday Midday

| Intersection               |       |       |       |       |      |      |      |      |      |      |      |      |
|----------------------------|-------|-------|-------|-------|------|------|------|------|------|------|------|------|
| Intersection Delay, s/veh  | 16.4  |       |       |       |      |      |      |      |      |      |      |      |
| Intersection LOS           | C     |       |       |       |      |      |      |      |      |      |      |      |
| Movement                   | EBL   | EBT   | EBR   | WBL   | WBT  | WBR  | NBL  | NBT  | NBR  | SBL  | SBT  | SBR  |
| Lane Configurations        |       | ↔     |       |       | ↔    |      |      | ↔    |      |      | ↔    |      |
| Traffic Vol, veh/h         | 2     | 0     | 1     | 60    | 25   | 35   | 50   | 380  | 1    | 1    | 360  | 150  |
| Future Vol, veh/h          | 2     | 0     | 1     | 60    | 25   | 35   | 50   | 380  | 1    | 1    | 360  | 150  |
| Peak Hour Factor           | 0.75  | 0.75  | 0.75  | 0.91  | 0.91 | 0.91 | 0.93 | 0.93 | 0.93 | 0.98 | 0.98 | 0.98 |
| Heavy Vehicles, %          | 0     | 0     | 0     | 0     | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    |
| Mvmt Flow                  | 3     | 0     | 1     | 66    | 27   | 38   | 54   | 409  | 1    | 1    | 367  | 153  |
| Number of Lanes            | 0     | 1     | 0     | 0     | 1    | 0    | 0    | 1    | 0    | 0    | 1    | 0    |
| Approach                   | EB    |       |       | WB    |      |      | NB   |      |      | SB   |      |      |
| Opposing Approach          | WB    |       |       | EB    |      |      | SB   |      |      | NB   |      |      |
| Opposing Lanes             | 1     |       |       | 1     |      |      | 1    |      |      | 1    |      |      |
| Conflicting Approach Left  | SB    |       |       | NB    |      |      | EB   |      |      | WB   |      |      |
| Conflicting Lanes Left     | 1     |       |       | 1     |      |      | 1    |      |      | 1    |      |      |
| Conflicting Approach Right | NB    |       |       | SB    |      |      | WB   |      |      | EB   |      |      |
| Conflicting Lanes Right    | 1     |       |       | 1     |      |      | 1    |      |      | 1    |      |      |
| HCM Control Delay          | 9.6   |       |       | 10.9  |      |      | 16.6 |      |      | 17.7 |      |      |
| HCM LOS                    | A     |       |       | B     |      |      | C    |      |      | C    |      |      |
| Lane                       | NBLn1 | EBLn1 | WBLn1 | SBLn1 |      |      |      |      |      |      |      |      |
| Vol Left, %                | 12%   | 67%   | 50%   | 0%    |      |      |      |      |      |      |      |      |
| Vol Thru, %                | 88%   | 0%    | 21%   | 70%   |      |      |      |      |      |      |      |      |
| Vol Right, %               | 0%    | 33%   | 29%   | 29%   |      |      |      |      |      |      |      |      |
| Sign Control               | Stop  | Stop  | Stop  | Stop  |      |      |      |      |      |      |      |      |
| Traffic Vol by Lane        | 431   | 3     | 120   | 511   |      |      |      |      |      |      |      |      |
| LT Vol                     | 50    | 2     | 60    | 1     |      |      |      |      |      |      |      |      |
| Through Vol                | 380   | 0     | 25    | 360   |      |      |      |      |      |      |      |      |
| RT Vol                     | 1     | 1     | 35    | 150   |      |      |      |      |      |      |      |      |
| Lane Flow Rate             | 463   | 4     | 132   | 521   |      |      |      |      |      |      |      |      |
| Geometry Grp               | 1     | 1     | 1     | 1     |      |      |      |      |      |      |      |      |
| Degree of Util (X)         | 0.644 | 0.007 | 0.224 | 0.69  |      |      |      |      |      |      |      |      |
| Departure Headway (Hd)     | 5.006 | 6.494 | 6.103 | 4.764 |      |      |      |      |      |      |      |      |
| Convergence, Y/N           | Yes   | Yes   | Yes   | Yes   |      |      |      |      |      |      |      |      |
| Cap                        | 723   | 550   | 588   | 761   |      |      |      |      |      |      |      |      |
| Service Time               | 3.019 | 4.552 | 4.144 | 2.776 |      |      |      |      |      |      |      |      |
| HCM Lane V/C Ratio         | 0.64  | 0.007 | 0.224 | 0.685 |      |      |      |      |      |      |      |      |
| HCM Control Delay          | 16.6  | 9.6   | 10.9  | 17.7  |      |      |      |      |      |      |      |      |
| HCM Lane LOS               | C     | A     | B     | C     |      |      |      |      |      |      |      |      |
| HCM 95th-tile Q            | 4.7   | 0     | 0.9   | 5.6   |      |      |      |      |      |      |      |      |

12239.00 :: Needham Street  
2: Chestnut Street & Route 9 EB Access Road

2018 Existing Conditions  
Timing Plan: Saturday Midday

| Intersection               |       |       |       |       |      |      |      |      |      |      |      |      |
|----------------------------|-------|-------|-------|-------|------|------|------|------|------|------|------|------|
| Intersection Delay, s/veh  | 15.9  |       |       |       |      |      |      |      |      |      |      |      |
| Intersection LOS           | C     |       |       |       |      |      |      |      |      |      |      |      |
|                            |       |       |       |       |      |      |      |      |      |      |      |      |
| Movement                   | EBL   | EBT   | EBR   | WBL   | WBT  | WBR  | NBL  | NBT  | NBR  | SBL  | SBT  | SBR  |
| Lane Configurations        |       | ↔     |       |       | ↔    |      |      | ↔    |      |      | ↔    |      |
| Traffic Vol, veh/h         | 105   | 120   | 15    | 0     | 2    | 20   | 0    | 305  | 40   | 100  | 320  | 2    |
| Future Vol, veh/h          | 105   | 120   | 15    | 0     | 2    | 20   | 0    | 305  | 40   | 100  | 320  | 2    |
| Peak Hour Factor           | 0.87  | 0.87  | 0.87  | 0.92  | 0.92 | 0.92 | 0.94 | 0.94 | 0.94 | 0.99 | 0.99 | 0.99 |
| Heavy Vehicles, %          | 0     | 0     | 0     | 0     | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    |
| Mvmt Flow                  | 121   | 138   | 17    | 0     | 2    | 22   | 0    | 324  | 43   | 101  | 323  | 2    |
| Number of Lanes            | 0     | 1     | 0     | 0     | 1    | 0    | 0    | 1    | 0    | 0    | 1    | 0    |
|                            |       |       |       |       |      |      |      |      |      |      |      |      |
| Approach                   | EB    |       |       | WB    |      |      | NB   |      |      | SB   |      |      |
| Opposing Approach          | WB    |       |       | EB    |      |      | SB   |      |      | NB   |      |      |
| Opposing Lanes             | 1     |       |       | 1     |      |      | 1    |      |      | 1    |      |      |
| Conflicting Approach Left  | SB    |       |       | NB    |      |      | EB   |      |      | WB   |      |      |
| Conflicting Lanes Left     | 1     |       |       | 1     |      |      | 1    |      |      | 1    |      |      |
| Conflicting Approach Right | NB    |       |       | SB    |      |      | WB   |      |      | EB   |      |      |
| Conflicting Lanes Right    | 1     |       |       | 1     |      |      | 1    |      |      | 1    |      |      |
| HCM Control Delay          | 14.3  |       |       | 9.5   |      |      | 15.1 |      |      | 18   |      |      |
| HCM LOS                    | B     |       |       | A     |      |      | C    |      |      | C    |      |      |
|                            |       |       |       |       |      |      |      |      |      |      |      |      |
| Lane                       | NBLn1 | EBLn1 | WBLn1 | SBLn1 |      |      |      |      |      |      |      |      |
| Vol Left, %                | 0%    | 44%   | 0%    | 24%   |      |      |      |      |      |      |      |      |
| Vol Thru, %                | 88%   | 50%   | 9%    | 76%   |      |      |      |      |      |      |      |      |
| Vol Right, %               | 12%   | 6%    | 91%   | 0%    |      |      |      |      |      |      |      |      |
| Sign Control               | Stop  | Stop  | Stop  | Stop  |      |      |      |      |      |      |      |      |
| Traffic Vol by Lane        | 345   | 240   | 22    | 422   |      |      |      |      |      |      |      |      |
| LT Vol                     | 0     | 105   | 0     | 100   |      |      |      |      |      |      |      |      |
| Through Vol                | 305   | 120   | 2     | 320   |      |      |      |      |      |      |      |      |
| RT Vol                     | 40    | 15    | 20    | 2     |      |      |      |      |      |      |      |      |
| Lane Flow Rate             | 367   | 276   | 24    | 426   |      |      |      |      |      |      |      |      |
| Geometry Grp               | 1     | 1     | 1     | 1     |      |      |      |      |      |      |      |      |
| Degree of Util (X)         | 0.555 | 0.465 | 0.041 | 0.646 |      |      |      |      |      |      |      |      |
| Departure Headway (Hd)     | 5.439 | 6.062 | 6.237 | 5.459 |      |      |      |      |      |      |      |      |
| Convergence, Y/N           | Yes   | Yes   | Yes   | Yes   |      |      |      |      |      |      |      |      |
| Cap                        | 661   | 590   | 578   | 661   |      |      |      |      |      |      |      |      |
| Service Time               | 3.5   | 4.127 | 4.237 | 3.519 |      |      |      |      |      |      |      |      |
| HCM Lane V/C Ratio         | 0.555 | 0.468 | 0.042 | 0.644 |      |      |      |      |      |      |      |      |
| HCM Control Delay          | 15.1  | 14.3  | 9.5   | 18    |      |      |      |      |      |      |      |      |
| HCM Lane LOS               | C     | B     | A     | C     |      |      |      |      |      |      |      |      |
| HCM 95th-tile Q            | 3.4   | 2.5   | 0.1   | 4.7   |      |      |      |      |      |      |      |      |



12239.00 :: Needham Street  
3: Chestnut Street & Elliot Street

2018 Existing Conditions  
Timing Plan: Saturday Midday

|                         |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|-------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|
| Lane Group              | EBL                                                                               | EBT                                                                               | EBR                                                                               | WBL                                                                               | WBT                                                                               | WBR                                                                               | NBL                                                                               | NBT                                                                               | NBR                                                                               | SBL                                                                               | SBT                                                                               | SBR                                                                               | Ø3                                                                                |                                                                                   |                                                                                   |
| Lane Configurations     |  |                                                                                   |                                                                                   |                                                                                   |  |                                                                                   |                                                                                   |  |                                                                                   |                                                                                   |  |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| Traffic Volume (vph)    | 180                                                                               | 150                                                                               | 45                                                                                | 5                                                                                 | 120                                                                               | 65                                                                                | 75                                                                                | 175                                                                               | 10                                                                                | 55                                                                                | 245                                                                               | 190                                                                               |                                                                                   |                                                                                   |                                                                                   |
| Future Volume (vph)     | 180                                                                               | 150                                                                               | 45                                                                                | 5                                                                                 | 120                                                                               | 65                                                                                | 75                                                                                | 175                                                                               | 10                                                                                | 55                                                                                | 245                                                                               | 190                                                                               |                                                                                   |                                                                                   |                                                                                   |
| Ideal Flow (vphpl)      | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                              |                                                                                   |                                                                                   |                                                                                   |
| Satd. Flow (prot)       | 0                                                                                 | 1821                                                                              | 0                                                                                 | 0                                                                                 | 1773                                                                              | 0                                                                                 | 0                                                                                 | 1862                                                                              | 0                                                                                 | 0                                                                                 | 1770                                                                              | 0                                                                                 |                                                                                   |                                                                                   |                                                                                   |
| Flt Permitted           |                                                                                   | 0.742                                                                             |                                                                                   |                                                                                   | 0.991                                                                             |                                                                                   |                                                                                   | 0.687                                                                             |                                                                                   |                                                                                   | 0.937                                                                             |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| Satd. Flow (perm)       | 0                                                                                 | 1379                                                                              |                                                                                   | 0                                                                                 | 1758                                                                              | 0                                                                                 | 0                                                                                 | 1296                                                                              | 0                                                                                 | 0                                                                                 | 1668                                                                              | 0                                                                                 |                                                                                   |                                                                                   |                                                                                   |
| Right Turn on Red       |                                                                                   |                                                                                   | Yes                                                                               |                                                                                   |                                                                                   | Yes                                                                               |                                                                                   |                                                                                   | Yes                                                                               |                                                                                   |                                                                                   | Yes                                                                               |                                                                                   |                                                                                   |                                                                                   |
| Satd. Flow (RTOR)       |                                                                                   | 8                                                                                 |                                                                                   |                                                                                   | 32                                                                                |                                                                                   |                                                                                   | 2                                                                                 |                                                                                   |                                                                                   | 39                                                                                |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| Link Speed (mph)        |                                                                                   | 30                                                                                |                                                                                   |                                                                                   | 30                                                                                |                                                                                   |                                                                                   | 30                                                                                |                                                                                   |                                                                                   | 30                                                                                |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| Link Distance (ft)      |                                                                                   | 764                                                                               |                                                                                   |                                                                                   | 972                                                                               |                                                                                   |                                                                                   | 2055                                                                              |                                                                                   |                                                                                   | 1553                                                                              |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| Travel Time (s)         |                                                                                   | 17.4                                                                              |                                                                                   |                                                                                   | 22.1                                                                              |                                                                                   |                                                                                   | 46.7                                                                              |                                                                                   |                                                                                   | 35.3                                                                              |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| Confl. Peds. (#/hr)     | 6                                                                                 |                                                                                   | 4                                                                                 | 4                                                                                 |                                                                                   | 6                                                                                 | 6                                                                                 |                                                                                   | 2                                                                                 | 2                                                                                 |                                                                                   | 6                                                                                 |                                                                                   |                                                                                   |                                                                                   |
| Confl. Bikes (#/hr)     |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   | 4                                                                                 |                                                                                   |                                                                                   | 2                                                                                 |                                                                                   |                                                                                   | 1                                                                                 |                                                                                   |                                                                                   |                                                                                   |
| Peak Hour Factor        | 0.94                                                                              | 0.94                                                                              | 0.94                                                                              | 0.91                                                                              | 0.91                                                                              | 0.91                                                                              | 0.93                                                                              | 0.93                                                                              | 0.93                                                                              | 0.96                                                                              | 0.96                                                                              | 0.96                                                                              |                                                                                   |                                                                                   |                                                                                   |
| Heavy Vehicles (%)      | 0%                                                                                | 0%                                                                                | 0%                                                                                | 1%                                                                                | 1%                                                                                | 1%                                                                                | 0%                                                                                | 0%                                                                                | 0%                                                                                | 0%                                                                                | 0%                                                                                | 0%                                                                                |                                                                                   |                                                                                   |                                                                                   |
| Shared Lane Traffic (%) |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| Lane Group Flow (vph)   | 0                                                                                 | 399                                                                               | 0                                                                                 | 0                                                                                 | 208                                                                               | 0                                                                                 | 0                                                                                 | 280                                                                               | 0                                                                                 | 0                                                                                 | 510                                                                               | 0                                                                                 |                                                                                   |                                                                                   |                                                                                   |
| Turn Type               | Perm                                                                              | NA                                                                                |                                                                                   | Perm                                                                              | NA                                                                                |                                                                                   | Perm                                                                              | NA                                                                                |                                                                                   | Perm                                                                              | NA                                                                                |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| Protected Phases        |                                                                                   | 1                                                                                 |                                                                                   |                                                                                   | 1                                                                                 |                                                                                   |                                                                                   | 2                                                                                 |                                                                                   |                                                                                   | 2                                                                                 |                                                                                   | 3                                                                                 |                                                                                   |                                                                                   |
| Permitted Phases        | 1                                                                                 |                                                                                   |                                                                                   | 1                                                                                 |                                                                                   |                                                                                   | 2                                                                                 |                                                                                   |                                                                                   | 2                                                                                 |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| Detector Phase          | 1                                                                                 | 1                                                                                 |                                                                                   | 1                                                                                 | 1                                                                                 |                                                                                   | 2                                                                                 | 2                                                                                 |                                                                                   | 2                                                                                 | 2                                                                                 |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| Switch Phase            |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| Minimum Initial (s)     | 6.0                                                                               | 6.0                                                                               |                                                                                   | 6.0                                                                               | 6.0                                                                               |                                                                                   | 6.0                                                                               | 6.0                                                                               |                                                                                   | 6.0                                                                               | 6.0                                                                               |                                                                                   | 4.0                                                                               |                                                                                   |                                                                                   |
| Minimum Split (s)       | 11.0                                                                              | 11.0                                                                              |                                                                                   | 11.0                                                                              | 11.0                                                                              |                                                                                   | 11.0                                                                              | 11.0                                                                              |                                                                                   | 11.0                                                                              | 11.0                                                                              |                                                                                   | 19.0                                                                              |                                                                                   |                                                                                   |
| Total Split (s)         | 35.0                                                                              | 35.0                                                                              |                                                                                   | 35.0                                                                              | 35.0                                                                              |                                                                                   | 35.0                                                                              | 35.0                                                                              |                                                                                   | 35.0                                                                              | 35.0                                                                              |                                                                                   | 19.0                                                                              |                                                                                   |                                                                                   |
| Total Split (%)         | 39.3%                                                                             | 39.3%                                                                             |                                                                                   | 39.3%                                                                             | 39.3%                                                                             |                                                                                   | 39.3%                                                                             | 39.3%                                                                             |                                                                                   | 39.3%                                                                             | 39.3%                                                                             |                                                                                   | 21%                                                                               |                                                                                   |                                                                                   |
| Yellow Time (s)         | 3.0                                                                               | 3.0                                                                               |                                                                                   | 3.0                                                                               | 3.0                                                                               |                                                                                   | 3.0                                                                               | 3.0                                                                               |                                                                                   | 3.0                                                                               | 3.0                                                                               |                                                                                   | 3.0                                                                               |                                                                                   |                                                                                   |
| All-Red Time (s)        | 2.0                                                                               | 2.0                                                                               |                                                                                   | 2.0                                                                               | 2.0                                                                               |                                                                                   | 2.0                                                                               | 2.0                                                                               |                                                                                   | 2.0                                                                               | 2.0                                                                               |                                                                                   | 1.0                                                                               |                                                                                   |                                                                                   |
| Lost Time Adjust (s)    | 0.0                                                                               | 0.0                                                                               |                                                                                   | 0.0                                                                               | 0.0                                                                               |                                                                                   | 0.0                                                                               | 0.0                                                                               |                                                                                   | 0.0                                                                               | 0.0                                                                               |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| Total Lost Time (s)     | 5.0                                                                               | 5.0                                                                               |                                                                                   | 5.0                                                                               | 5.0                                                                               |                                                                                   | 5.0                                                                               | 5.0                                                                               |                                                                                   | 5.0                                                                               | 5.0                                                                               |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| Lead/Lag                | Lead                                                                              | Lead                                                                              |                                                                                   | Lead                                                                              | Lead                                                                              |                                                                                   | Lag                                                                               | Lag                                                                               |                                                                                   | Lag                                                                               | Lag                                                                               |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| Lead-Lag Optimize?      |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| Recall Mode             | None                                                                              | None                                                                              |                                                                                   | None                                                                              | None                                                                              |                                                                                   | None                                                                              | None                                                                              |                                                                                   | None                                                                              | None                                                                              |                                                                                   | None                                                                              |                                                                                   |                                                                                   |
| Act Effct Green (s)     | 26.0                                                                              |                                                                                   |                                                                                   | 26.0                                                                              |                                                                                   |                                                                                   | 24.9                                                                              |                                                                                   |                                                                                   | 24.9                                                                              |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| Actuated g/C Ratio      | 0.38                                                                              |                                                                                   |                                                                                   | 0.38                                                                              |                                                                                   |                                                                                   | 0.37                                                                              |                                                                                   |                                                                                   | 0.37                                                                              |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| v/c Ratio               | 0.75                                                                              | 0.30                                                                              |                                                                                   | 0.30                                                                              |                                                                                   |                                                                                   | 0.59                                                                              |                                                                                   |                                                                                   | 0.80                                                                              |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| Control Delay           | 31.9                                                                              |                                                                                   |                                                                                   | 16.7                                                                              |                                                                                   |                                                                                   | 26.3                                                                              |                                                                                   |                                                                                   | 31.7                                                                              |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| Queue Delay             | 0.0                                                                               | 0.0                                                                               |                                                                                   | 0.0                                                                               | 0.0                                                                               |                                                                                   | 0.0                                                                               | 0.0                                                                               |                                                                                   | 0.0                                                                               | 0.0                                                                               |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| Total Delay             | 31.9                                                                              |                                                                                   |                                                                                   | 16.7                                                                              |                                                                                   |                                                                                   | 26.3                                                                              |                                                                                   |                                                                                   | 31.7                                                                              |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| LOS                     | C                                                                                 |                                                                                   |                                                                                   | B                                                                                 |                                                                                   |                                                                                   | C                                                                                 |                                                                                   |                                                                                   | C                                                                                 |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| Approach Delay          | 31.9                                                                              |                                                                                   |                                                                                   | 16.7                                                                              |                                                                                   |                                                                                   | 26.3                                                                              |                                                                                   |                                                                                   | 31.7                                                                              |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| Approach LOS            | C                                                                                 |                                                                                   |                                                                                   | B                                                                                 |                                                                                   |                                                                                   | C                                                                                 |                                                                                   |                                                                                   | C                                                                                 |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| Queue Length 50th (ft)  | 117                                                                               |                                                                                   |                                                                                   | 42                                                                                |                                                                                   |                                                                                   | 80                                                                                |                                                                                   |                                                                                   | 152                                                                               |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| Queue Length 95th (ft)  | #367                                                                              |                                                                                   |                                                                                   | 130                                                                               |                                                                                   |                                                                                   | 220                                                                               |                                                                                   |                                                                                   | #432                                                                              |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| Internal Link Dist (ft) | 684                                                                               |                                                                                   |                                                                                   | 892                                                                               |                                                                                   |                                                                                   | 1975                                                                              |                                                                                   |                                                                                   | 1473                                                                              |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| Turn Bay Length (ft)    |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| Base Capacity (vph)     | 675                                                                               |                                                                                   |                                                                                   | 871                                                                               |                                                                                   |                                                                                   | 631                                                                               |                                                                                   |                                                                                   | 831                                                                               |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| Starvation Cap Reductn  | 0                                                                                 |                                                                                   |                                                                                   | 0                                                                                 | 0                                                                                 |                                                                                   | 0                                                                                 | 0                                                                                 |                                                                                   | 0                                                                                 | 0                                                                                 |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| Spillback Cap Reductn   | 0                                                                                 |                                                                                   |                                                                                   | 0                                                                                 | 0                                                                                 |                                                                                   | 0                                                                                 | 0                                                                                 |                                                                                   | 0                                                                                 | 0                                                                                 |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| Storage Cap Reductn     | 0                                                                                 |                                                                                   |                                                                                   | 0                                                                                 | 0                                                                                 |                                                                                   | 0                                                                                 | 0                                                                                 |                                                                                   | 0                                                                                 | 0                                                                                 |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| Reduced v/c Ratio       | 0.59                                                                              |                                                                                   |                                                                                   | 0.24                                                                              |                                                                                   |                                                                                   | 0.44                                                                              |                                                                                   |                                                                                   | 0.61                                                                              |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |

Intersection Summary

Area Type: Other

Cycle Length: 89

Actuated Cycle Length: 67.6

Natural Cycle: 90

Control Type: Actuated-Uncoordinated

Maximum v/c Ratio: 0.80

Intersection Signal Delay: 28.4

Intersection LOS: C

Intersection Capacity Utilization 74.2%

ICU Level of Service D

Analysis Period (min) 15

# 95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

Splits and Phases: 3: Chestnut Street & Elliot Street



Lanes, Volumes, Timings  
VHB/MSD

\\vhb\proj\Wat-LD\12239.00\tech\Traffic\Synchro\TIA\_2018\2018 EX\_SAT\_syn  
07/03/2018

12239.00 :: Needham Street  
4: Oak Street & Chestnut Street

2018 Existing Conditions  
Timing Plan: Saturday Midday

|                         |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|-------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
| Lane Group              | EBL                                                                                 | EBT                                                                                 | EBR                                                                                 | WBL                                                                                 | WBT                                                                                 | WBR                                                                                 | NBL                                                                                 | NBT                                                                                 | NBR                                                                                 | SBL                                                                                 | SBT                                                                                 | SBR                                                                                 | Ø3                                                                                  |                                                                                     |                                                                                     |
| Lane Configurations     |  |                                                                                     |                                                                                     |                                                                                     |  |                                                                                     |                                                                                     |  |                                                                                     |                                                                                     |  |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Traffic Volume (vph)    | 20                                                                                  | 10                                                                                  | 315                                                                                 | 20                                                                                  | 10                                                                                  | 2                                                                                   | 220                                                                                 | 80                                                                                  | 25                                                                                  | 5                                                                                   | 110                                                                                 | 20                                                                                  |                                                                                     |                                                                                     |                                                                                     |
| Future Volume (vph)     | 20                                                                                  | 10                                                                                  | 315                                                                                 | 20                                                                                  | 10                                                                                  | 2                                                                                   | 220                                                                                 | 80                                                                                  | 25                                                                                  | 5                                                                                   | 110                                                                                 | 20                                                                                  |                                                                                     |                                                                                     |                                                                                     |
| Ideal Flow (vphpl)      | 1900                                                                                | 1900                                                                                | 1900                                                                                | 1900                                                                                | 1900                                                                                | 1900                                                                                | 1900                                                                                | 1900                                                                                | 1900                                                                                | 1900                                                                                | 1900                                                                                | 1900                                                                                |                                                                                     |                                                                                     |                                                                                     |
| Satd. Flow (prot)       | 0                                                                                   | 1624                                                                                | 0                                                                                   | 0                                                                                   | 1822                                                                                | 0                                                                                   | 0                                                                                   | 1815                                                                                | 0                                                                                   | 0                                                                                   | 1814                                                                                | 0                                                                                   |                                                                                     |                                                                                     |                                                                                     |
| Fit Permitted           |                                                                                     | 0.980                                                                               |                                                                                     |                                                                                     | 0.561                                                                               |                                                                                     |                                                                                     | 0.704                                                                               |                                                                                     |                                                                                     | 0.984                                                                               |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Satd. Flow (perm)       | 0                                                                                   | 1596                                                                                |                                                                                     | 0                                                                                   | 1053                                                                                | 0                                                                                   | 0                                                                                   | 1316                                                                                | 0                                                                                   | 0                                                                                   | 1788                                                                                | 0                                                                                   |                                                                                     |                                                                                     |                                                                                     |
| Right Turn on Red       |                                                                                     |                                                                                     | Yes                                                                                 |                                                                                     |                                                                                     | Yes                                                                                 |                                                                                     |                                                                                     | Yes                                                                                 |                                                                                     |                                                                                     | Yes                                                                                 |                                                                                     |                                                                                     |                                                                                     |
| Satd. Flow (RTOR)       |                                                                                     | 328                                                                                 |                                                                                     |                                                                                     | 3                                                                                   |                                                                                     |                                                                                     | 4                                                                                   |                                                                                     |                                                                                     | 10                                                                                  |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Link Speed (mph)        |                                                                                     | 30                                                                                  |                                                                                     |                                                                                     | 30                                                                                  |                                                                                     |                                                                                     | 30                                                                                  |                                                                                     |                                                                                     | 30                                                                                  |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Link Distance (ft)      |                                                                                     | 2055                                                                                |                                                                                     |                                                                                     | 492                                                                                 |                                                                                     |                                                                                     | 226                                                                                 |                                                                                     |                                                                                     | 762                                                                                 |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Travel Time (s)         |                                                                                     | 46.7                                                                                |                                                                                     |                                                                                     | 11.2                                                                                |                                                                                     |                                                                                     | 5.1                                                                                 |                                                                                     |                                                                                     | 17.3                                                                                |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Confl. Peds. (#/hr)     | 1                                                                                   |                                                                                     | 3                                                                                   | 3                                                                                   |                                                                                     | 1                                                                                   | 5                                                                                   |                                                                                     | 7                                                                                   | 7                                                                                   |                                                                                     | 5                                                                                   |                                                                                     |                                                                                     |                                                                                     |
| Confl. Bikes (#/hr)     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     | 2                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Peak Hour Factor        | 0.96                                                                                | 0.96                                                                                | 0.96                                                                                | 0.70                                                                                | 0.70                                                                                | 0.70                                                                                | 0.88                                                                                | 0.88                                                                                | 0.88                                                                                | 0.87                                                                                | 0.87                                                                                | 0.87                                                                                |                                                                                     |                                                                                     |                                                                                     |
| Heavy Vehicles (%)      | 0%                                                                                  | 0%                                                                                  | 0%                                                                                  | 0%                                                                                  | 0%                                                                                  | 0%                                                                                  | 0%                                                                                  | 0%                                                                                  | 0%                                                                                  | 2%                                                                                  | 2%                                                                                  | 2%                                                                                  |                                                                                     |                                                                                     |                                                                                     |
| Shared Lane Traffic (%) |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Lane Group Flow (vph)   | 0                                                                                   | 359                                                                                 | 0                                                                                   | 0                                                                                   | 46                                                                                  | 0                                                                                   | 0                                                                                   | 369                                                                                 | 0                                                                                   | 0                                                                                   | 155                                                                                 | 0                                                                                   |                                                                                     |                                                                                     |                                                                                     |
| Turn Type               | Perm                                                                                | NA                                                                                  |                                                                                     | Perm                                                                                | NA                                                                                  |                                                                                     | Perm                                                                                | NA                                                                                  |                                                                                     | Perm                                                                                | NA                                                                                  |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Protected Phases        |                                                                                     | 1                                                                                   |                                                                                     |                                                                                     | 1                                                                                   |                                                                                     |                                                                                     | 2                                                                                   |                                                                                     |                                                                                     | 2                                                                                   |                                                                                     | 3                                                                                   |                                                                                     |                                                                                     |
| Permitted Phases        | 1                                                                                   |                                                                                     |                                                                                     | 1                                                                                   |                                                                                     |                                                                                     | 2                                                                                   |                                                                                     |                                                                                     | 2                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Detector Phase          | 1                                                                                   | 1                                                                                   |                                                                                     | 1                                                                                   | 1                                                                                   |                                                                                     | 2                                                                                   | 2                                                                                   |                                                                                     | 2                                                                                   | 2                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Switch Phase            |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Minimum Initial (s)     | 8.0                                                                                 | 8.0                                                                                 |                                                                                     | 8.0                                                                                 | 8.0                                                                                 |                                                                                     | 8.0                                                                                 | 8.0                                                                                 |                                                                                     | 8.0                                                                                 | 8.0                                                                                 |                                                                                     | 8.0                                                                                 |                                                                                     |                                                                                     |
| Minimum Split (s)       | 13.0                                                                                | 13.0                                                                                |                                                                                     | 13.0                                                                                | 13.0                                                                                |                                                                                     | 14.0                                                                                | 14.0                                                                                |                                                                                     | 14.0                                                                                | 14.0                                                                                |                                                                                     | 18.0                                                                                |                                                                                     |                                                                                     |
| Total Split (s)         | 35.0                                                                                | 35.0                                                                                |                                                                                     | 35.0                                                                                | 35.0                                                                                |                                                                                     | 36.0                                                                                | 36.0                                                                                |                                                                                     | 36.0                                                                                | 36.0                                                                                |                                                                                     | 25.0                                                                                |                                                                                     |                                                                                     |
| Total Split (%)         | 36.5%                                                                               | 36.5%                                                                               |                                                                                     | 36.5%                                                                               | 36.5%                                                                               |                                                                                     | 37.5%                                                                               | 37.5%                                                                               |                                                                                     | 37.5%                                                                               | 37.5%                                                                               |                                                                                     | 26%                                                                                 |                                                                                     |                                                                                     |
| Yellow Time (s)         | 4.0                                                                                 | 4.0                                                                                 |                                                                                     | 4.0                                                                                 | 4.0                                                                                 |                                                                                     | 4.0                                                                                 | 4.0                                                                                 |                                                                                     | 4.0                                                                                 | 4.0                                                                                 |                                                                                     | 4.0                                                                                 |                                                                                     |                                                                                     |
| All-Red Time (s)        | 1.0                                                                                 | 1.0                                                                                 |                                                                                     | 1.0                                                                                 | 1.0                                                                                 |                                                                                     | 2.0                                                                                 | 2.0                                                                                 |                                                                                     | 2.0                                                                                 | 2.0                                                                                 |                                                                                     | 1.0                                                                                 |                                                                                     |                                                                                     |
| Lost Time Adjust (s)    | 0.0                                                                                 | 0.0                                                                                 |                                                                                     | 0.0                                                                                 | 0.0                                                                                 |                                                                                     | 0.0                                                                                 | 0.0                                                                                 |                                                                                     | 0.0                                                                                 | 0.0                                                                                 |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Total Lost Time (s)     | 5.0                                                                                 | 5.0                                                                                 |                                                                                     | 5.0                                                                                 | 5.0                                                                                 |                                                                                     | 6.0                                                                                 | 6.0                                                                                 |                                                                                     | 6.0                                                                                 | 6.0                                                                                 |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Lead/Lag                | Lead                                                                                | Lead                                                                                |                                                                                     | Lead                                                                                | Lead                                                                                |                                                                                     | Lag                                                                                 | Lag                                                                                 |                                                                                     | Lag                                                                                 | Lag                                                                                 |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Lead-Lag Optimize?      |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Recall Mode             | Min                                                                                 | Min                                                                                 |                                                                                     | Min                                                                                 | Min                                                                                 |                                                                                     | Min                                                                                 | Min                                                                                 |                                                                                     | Min                                                                                 | Min                                                                                 |                                                                                     | None                                                                                |                                                                                     |                                                                                     |
| Act Effct Green (s)     | 10.8                                                                                |                                                                                     |                                                                                     | 10.8                                                                                |                                                                                     |                                                                                     | 22.4                                                                                |                                                                                     |                                                                                     | 22.4                                                                                |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Actuated g/C Ratio      | 0.23                                                                                |                                                                                     |                                                                                     | 0.23                                                                                |                                                                                     |                                                                                     | 0.47                                                                                |                                                                                     |                                                                                     | 0.47                                                                                |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| v/c Ratio               | 0.59                                                                                |                                                                                     |                                                                                     | 0.19                                                                                |                                                                                     |                                                                                     | 0.59                                                                                |                                                                                     |                                                                                     | 0.18                                                                                |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Control Delay           | 8.3                                                                                 |                                                                                     |                                                                                     | 19.6                                                                                |                                                                                     |                                                                                     | 16.5                                                                                |                                                                                     |                                                                                     | 9.6                                                                                 |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Queue Delay             | 0.0                                                                                 |                                                                                     |                                                                                     | 0.0                                                                                 |                                                                                     |                                                                                     | 0.0                                                                                 |                                                                                     |                                                                                     | 0.0                                                                                 |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Total Delay             | 8.3                                                                                 |                                                                                     |                                                                                     | 19.6                                                                                |                                                                                     |                                                                                     | 16.5                                                                                |                                                                                     |                                                                                     | 9.6                                                                                 |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| LOS                     | A                                                                                   |                                                                                     |                                                                                     | B                                                                                   |                                                                                     |                                                                                     | B                                                                                   |                                                                                     |                                                                                     | A                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Approach Delay          | 8.3                                                                                 |                                                                                     |                                                                                     | 19.6                                                                                |                                                                                     |                                                                                     | 16.5                                                                                |                                                                                     |                                                                                     | 9.6                                                                                 |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Approach LOS            | A                                                                                   |                                                                                     |                                                                                     | B                                                                                   |                                                                                     |                                                                                     | B                                                                                   |                                                                                     |                                                                                     | A                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Queue Length 50th (ft)  | 6                                                                                   |                                                                                     |                                                                                     | 8                                                                                   |                                                                                     |                                                                                     | 49                                                                                  |                                                                                     |                                                                                     | 15                                                                                  |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Queue Length 95th (ft)  | 81                                                                                  |                                                                                     |                                                                                     | 33                                                                                  |                                                                                     |                                                                                     | #244                                                                                |                                                                                     |                                                                                     | 83                                                                                  |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Internal Link Dist (ft) | 1975                                                                                |                                                                                     |                                                                                     | 412                                                                                 |                                                                                     |                                                                                     | 146                                                                                 |                                                                                     |                                                                                     | 682                                                                                 |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Turn Bay Length (ft)    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Base Capacity (vph)     | 1201                                                                                |                                                                                     |                                                                                     | 725                                                                                 |                                                                                     |                                                                                     | 907                                                                                 |                                                                                     |                                                                                     | 1234                                                                                |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Starvation Cap Reductn  | 0                                                                                   |                                                                                     |                                                                                     | 0                                                                                   |                                                                                     |                                                                                     | 0                                                                                   |                                                                                     |                                                                                     | 0                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Spillback Cap Reductn   | 0                                                                                   |                                                                                     |                                                                                     | 0                                                                                   |                                                                                     |                                                                                     | 0                                                                                   |                                                                                     |                                                                                     | 0                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Storage Cap Reductn     | 0                                                                                   |                                                                                     |                                                                                     | 0                                                                                   |                                                                                     |                                                                                     | 0                                                                                   |                                                                                     |                                                                                     | 0                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Reduced v/c Ratio       | 0.30                                                                                |                                                                                     |                                                                                     | 0.06                                                                                |                                                                                     |                                                                                     | 0.41                                                                                |                                                                                     |                                                                                     | 0.13                                                                                |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |

Intersection Summary

Area Type: Other

Cycle Length: 96

Actuated Cycle Length: 47.3

Natural Cycle: 60

Control Type: Actuated-Uncoordinated

Maximum v/c Ratio: 0.59

Intersection Signal Delay: 12.3

Intersection LOS: B

Intersection Capacity Utilization 60.7%

ICU Level of Service B

Analysis Period (min) 15

# 95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

Splits and Phases: 4: Oak Street & Chestnut Street



Lanes, Volumes, Timings  
VHB/MSD

\\vhb\proj\Wat-LD\12239.00\tech\Traffic\Synchro\TIA\_2018\2018 EX\_SAT\_syn  
07/03/2018

12239.00 :: Needham Street  
5: Oak Street & Site Driveway

2018 Existing Conditions  
Timing Plan: Saturday MIDDAY

| Intersection             |        |        |       |        |      |      |
|--------------------------|--------|--------|-------|--------|------|------|
| Int Delay, s/veh         | 0.3    |        |       |        |      |      |
| Movement                 | WBL    | WBR    | NBT   | NBR    | SBL  | SBT  |
| Lane Configurations      | ↔      |        | ↔     |        |      | ↔    |
| Traffic Vol, veh/h       | 5      | 1      | 325   | 1      | 1    | 445  |
| Future Vol, veh/h        | 5      | 1      | 325   | 1      | 1    | 445  |
| Conflicting Peds, #/hr   | 0      | 2      | 0     | 6      | 6    | 0    |
| Sign Control             | Stop   | Stop   | Free  | Free   | Free | Free |
| RT Channelized           | -      | None   | -     | None   | -    | None |
| Storage Length           | 0      | -      | -     | -      | -    | -    |
| Veh in Median Storage, # | 0      | -      | 0     | -      | -    | 0    |
| Grade, %                 | 0      | -      | 0     | -      | -    | 0    |
| Peak Hour Factor         | 33     | 33     | 89    | 89     | 94   | 94   |
| Heavy Vehicles, %        | 0      | 0      | 0     | 0      | 0    | 0    |
| Mvmt Flow                | 15     | 3      | 365   | 1      | 1    | 473  |
| Major/Minor              |        |        |       |        |      |      |
|                          | Minor1 | Major1 |       | Major2 |      |      |
| Conflicting Flow All     | 848    | 374    | 0     | 0      | 372  | 0    |
| Stage 1                  | 372    | -      | -     | -      | -    | -    |
| Stage 2                  | 476    | -      | -     | -      | -    | -    |
| Critical Hdwy            | 6.4    | 6.2    | -     | -      | 4.1  | -    |
| Critical Hdwy Stg 1      | 5.4    | -      | -     | -      | -    | -    |
| Critical Hdwy Stg 2      | 5.4    | -      | -     | -      | -    | -    |
| Follow-up Hdwy           | 3.5    | 3.3    | -     | -      | 2.2  | -    |
| Pot Cap-1 Maneuver       | 334    | 677    | -     | -      | 1198 | -    |
| Stage 1                  | 702    | -      | -     | -      | -    | -    |
| Stage 2                  | 629    | -      | -     | -      | -    | -    |
| Platoon blocked, %       |        |        | -     | -      | -    | -    |
| Mov Cap-1 Maneuver       | 332    | 672    | -     | -      | 1196 | -    |
| Mov Cap-2 Maneuver       | 332    | -      | -     | -      | -    | -    |
| Stage 1                  | 698    | -      | -     | -      | -    | -    |
| Stage 2                  | 628    | -      | -     | -      | -    | -    |
| Approach                 |        |        |       |        |      |      |
|                          | WB     | NB     |       | SB     |      |      |
| HCM Control Delay, s     | 15.4   | 0      |       | 0      |      |      |
| HCM LOS                  | C      |        |       |        |      |      |
| Minor Lane/Major Mvmt    |        |        |       |        |      |      |
|                          | NBT    | NBR    | WBLn1 | SBL    | SBT  |      |
| Capacity (veh/h)         | -      | -      | 363   | 1196   | -    |      |
| HCM Lane V/C Ratio       | -      | -      | 0.05  | 0.001  | -    |      |
| HCM Control Delay (s)    | -      | -      | 15.4  | 8      | 0    |      |
| HCM Lane LOS             | -      | -      | C     | A      | A    |      |
| HCM 95th %tile Q(veh)    | -      | -      | 0.2   | 0      | -    |      |

12239.00 :: Needham Street  
6: Needham Street & Oak Street/Christina Street

2018 Existing Conditions  
Timing Plan: Saturday MIDDAY

| Lane Group              | EBL   | EBT   | EBR   | WBL   | WBT   | WBR  | NBL   | NBT   | NBR  | SBL   | SBT   | SBR  |
|-------------------------|-------|-------|-------|-------|-------|------|-------|-------|------|-------|-------|------|
| Lane Configurations     |       | W     | W     |       | W     | W    |       | W     | W    |       | W     | W    |
| Traffic Volume (vph)    | 235   | 60    | 150   | 125   | 80    | 60   | 110   | 545   | 55   | 30    | 625   | 135  |
| Future Volume (vph)     | 235   | 60    | 150   | 125   | 80    | 60   | 110   | 545   | 55   | 30    | 625   | 135  |
| Ideal Flow (vphpl)      | 1900  | 1900  | 1900  | 1900  | 1900  | 1900 | 1900  | 1900  | 1900 | 1900  | 1900  | 1900 |
| Storage Length (ft)     | 0     |       | 100   | 200   |       | 200  | 100   |       | 0    | 220   |       | 0    |
| Storage Lanes           | 0     |       | 1     | 0     |       | 0    | 1     |       | 0    | 1     |       | 0    |
| Taper Length (ft)       | 25    |       |       | 25    |       |      | 25    |       |      | 25    |       |      |
| Satd. Flow (prot)       | 0     | 1828  | 1615  | 0     | 1788  | 0    | 1805  | 1869  | 0    | 1787  | 1824  | 0    |
| Flt Permitted           |       | 0.592 |       |       | 0.559 |      | 0.146 |       |      | 0.262 |       |      |
| Satd. Flow (perm)       | 0     | 1122  | 1615  | 0     | 1023  | 0    | 277   | 1869  | 0    | 492   | 1824  | 0    |
| Right Turn on Red       |       |       | Yes   |       |       | Yes  |       |       | No   |       |       | No   |
| Satd. Flow (RTOR)       |       |       | 158   |       | 21    |      |       |       |      |       |       |      |
| Link Speed (mph)        |       | 30    |       |       | 30    |      |       | 30    |      |       | 30    |      |
| Link Distance (ft)      |       | 1238  |       |       | 516   |      |       | 754   |      |       | 275   |      |
| Travel Time (s)         |       | 28.1  |       |       | 11.7  |      |       | 17.1  |      |       | 6.3   |      |
| Confl. Peds. (#/hr)     | 3     |       |       |       |       | 3    |       |       | 3    | 3     |       |      |
| Confl. Bikes (#/hr)     |       |       |       |       |       |      |       | 1     |      |       |       | 1    |
| Peak Hour Factor        | 0.95  | 0.95  | 0.95  | 0.91  | 0.91  | 0.91 | 0.91  | 0.91  | 0.91 | 0.94  | 0.94  | 0.94 |
| Heavy Vehicles (%)      | 0%    | 0%    | 0%    | 0%    | 0%    | 0%   | 0%    | 0%    | 0%   | 1%    | 1%    | 1%   |
| Shared Lane Traffic (%) |       |       |       |       |       |      |       |       |      |       |       |      |
| Lane Group Flow (vph)   | 0     | 310   | 158   | 0     | 291   | 0    | 121   | 659   | 0    | 32    | 809   | 0    |
| Turn Type               | Perm  | NA    | Perm  | Perm  | NA    | Perm | NA    | Perm  | NA   | Perm  | NA    | Perm |
| Protected Phases        |       | 4     |       |       | 8     |      |       | 2     |      | 6     |       |      |
| Permitted Phases        | 4     |       | 4     | 8     |       |      | 2     |       |      | 6     |       |      |
| Detector Phase          | 4     | 4     | 4     | 8     | 8     |      | 2     | 2     |      | 6     | 6     |      |
| Switch Phase            |       |       |       |       |       |      |       |       |      |       |       |      |
| Minimum Initial (s)     | 4.0   | 4.0   | 4.0   | 4.0   | 4.0   |      | 4.0   | 4.0   |      | 4.0   | 4.0   |      |
| Minimum Split (s)       | 23.0  | 23.0  | 23.0  | 23.0  | 23.0  |      | 24.0  | 24.0  |      | 24.0  | 24.0  |      |
| Total Split (s)         | 25.0  | 25.0  | 25.0  | 25.0  | 25.0  |      | 46.0  | 46.0  |      | 46.0  | 46.0  |      |
| Total Split (%)         | 35.2% | 35.2% | 35.2% | 35.2% | 35.2% |      | 64.8% | 64.8% |      | 64.8% | 64.8% |      |
| Yellow Time (s)         | 4.0   | 4.0   | 4.0   | 4.0   | 4.0   |      | 4.0   | 4.0   |      | 4.0   | 4.0   |      |
| All-Red Time (s)        | 1.0   | 1.0   | 1.0   | 1.0   | 1.0   |      | 2.0   | 2.0   |      | 2.0   | 2.0   |      |
| Lost Time Adjust (s)    | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   |      | 0.0   | 0.0   |      | 0.0   | 0.0   |      |
| Total Lost Time (s)     | 5.0   | 5.0   | 5.0   | 5.0   | 5.0   |      | 6.0   | 6.0   |      | 6.0   | 6.0   |      |
| Lead/Lag                |       |       |       |       |       |      |       |       |      |       |       |      |
| Lead-Lag Optimize?      |       |       |       |       |       |      |       |       |      |       |       |      |
| Recall Mode             | None  | None  | None  | None  | None  |      | Min   | Min   |      | Min   | Min   |      |
| Act Effct Green (s)     | 20.3  | 20.3  | 20.3  | 20.3  | 20.3  |      | 32.9  | 32.9  |      | 32.9  | 32.9  |      |
| Actuated g/C Ratio      | 0.32  | 0.32  | 0.32  | 0.32  | 0.32  |      | 0.51  | 0.51  |      | 0.51  | 0.51  |      |
| v/c Ratio               | 0.88  | 0.26  | 0.87  | 0.87  | 0.86  |      | 0.86  | 0.69  |      | 0.13  | 0.87  |      |
| Control Delay           | 52.3  | 5.1   |       | 50.1  |       |      | 64.4  | 15.8  |      | 8.9   | 24.9  |      |
| Queue Delay             | 0.0   | 0.0   |       | 0.0   |       |      | 0.0   | 0.0   |      | 0.0   | 0.0   |      |
| Total Delay             | 52.3  | 5.1   |       | 50.1  |       |      | 64.4  | 15.8  |      | 8.9   | 24.9  |      |
| LOS                     | D     | A     |       | D     |       |      | E     | B     |      | A     | C     |      |
| Approach Delay          | 36.4  |       |       | 50.1  |       |      |       | 23.4  |      |       | 24.3  |      |
| Approach LOS            | D     |       |       | D     |       |      |       | C     |      |       | C     |      |
| Queue Length 50th (ft)  | 122   | 0     |       | 106   |       |      | 37    | 177   |      | 6     | 253   |      |
| Queue Length 95th (ft)  | #285  | 39    |       | #267  |       |      | #137  | 279   |      | 19    | #410  |      |
| Internal Link Dist (ft) | 1158  |       |       | 436   |       |      |       | 674   |      |       | 195   |      |
| Turn Bay Length (ft)    |       | 100   |       |       |       |      | 100   |       |      | 220   |       |      |
| Base Capacity (vph)     | 353   | 617   |       | 336   |       |      | 174   | 1178  |      | 310   | 1149  |      |
| Starvation Cap Reductn  | 0     | 0     |       | 0     |       |      | 0     | 0     |      | 0     | 0     |      |
| Spillback Cap Reductn   | 0     | 0     |       | 0     |       |      | 0     | 0     |      | 0     | 0     |      |
| Storage Cap Reductn     | 0     | 0     |       | 0     |       |      | 0     | 0     |      | 0     | 0     |      |
| Reduced v/c Ratio       | 0.88  | 0.26  |       | 0.87  |       |      | 0.70  | 0.56  |      | 0.10  | 0.70  |      |

| Intersection Summary                                            |                        |
|-----------------------------------------------------------------|------------------------|
| Area Type:                                                      | Other                  |
| Cycle Length: 71                                                |                        |
| Actuated Cycle Length: 64.3                                     |                        |
| Natural Cycle: 75                                               |                        |
| Control Type: Actuated-Uncoordinated                            |                        |
| Maximum v/c Ratio: 0.88                                         |                        |
| Intersection Signal Delay: 29.5                                 | Intersection LOS: C    |
| Intersection Capacity Utilization 87.6%                         | ICU Level of Service E |
| Analysis Period (min) 15                                        |                        |
| # 95th percentile volume exceeds capacity, queue may be longer. |                        |
| Queue shown is maximum after two cycles.                        |                        |



12239.00 :: Needham Street  
7: Needham Street & South Site Driveway

2018 Existing Conditions  
Timing Plan: Saturday MIDDAY

| Intersection             |                                                                                   |        |       |                                                                                   |                                                                                   |      |
|--------------------------|-----------------------------------------------------------------------------------|--------|-------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|------|
| Int Delay, s/veh         | 0.1                                                                               |        |       |                                                                                   |                                                                                   |      |
| Movement                 | EBL                                                                               | EBR    | NBL   | NBT                                                                               | SBT                                                                               | SBR  |
| Lane Configurations      |  |        |       |  |  |      |
| Traffic Vol, veh/h       | 1                                                                                 | 0      | 0     | 840                                                                               | 790                                                                               | 1    |
| Future Vol, veh/h        | 1                                                                                 | 0      | 0     | 840                                                                               | 790                                                                               | 1    |
| Conflicting Peds, #/hr   | 0                                                                                 | 0      | 0     | 8                                                                                 | 0                                                                                 | 8    |
| Sign Control             | Stop                                                                              | Stop   | Free  | Free                                                                              | Free                                                                              | Free |
| RT Channelized           | -                                                                                 | None   | -     | None                                                                              | -                                                                                 | None |
| Storage Length           | 0                                                                                 | -      | -     | -                                                                                 | -                                                                                 | -    |
| Veh in Median Storage, # | 0                                                                                 | -      | -     | 0                                                                                 | 0                                                                                 | -    |
| Grade, %                 | 0                                                                                 | -      | -     | 0                                                                                 | 0                                                                                 | -    |
| Peak Hour Factor         | 25                                                                                | 25     | 95    | 95                                                                                | 94                                                                                | 94   |
| Heavy Vehicles, %        | 0                                                                                 | 0      | 0     | 0                                                                                 | 1                                                                                 | 1    |
| Mvmt Flow                | 4                                                                                 | 0      | 0     | 884                                                                               | 840                                                                               | 1    |
| Major/Minor              |                                                                                   |        |       |                                                                                   |                                                                                   |      |
|                          | Minor2                                                                            | Major1 |       | Major2                                                                            |                                                                                   |      |
| Conflicting Flow All     | 1733                                                                              | 849    | 849   | 0                                                                                 | -                                                                                 | 0    |
| Stage 1                  | 849                                                                               | -      | -     | -                                                                                 | -                                                                                 | -    |
| Stage 2                  | 884                                                                               | -      | -     | -                                                                                 | -                                                                                 | -    |
| Critical Hdwy            | 6.4                                                                               | 6.2    | 4.1   | -                                                                                 | -                                                                                 | -    |
| Critical Hdwy Stg 1      | 5.4                                                                               | -      | -     | -                                                                                 | -                                                                                 | -    |
| Critical Hdwy Stg 2      | 5.4                                                                               | -      | -     | -                                                                                 | -                                                                                 | -    |
| Follow-up Hdwy           | 3.5                                                                               | 3.3    | 2.2   | -                                                                                 | -                                                                                 | -    |
| Pot Cap-1 Maneuver       | 98                                                                                | 364    | 798   | -                                                                                 | -                                                                                 | -    |
| Stage 1                  | 423                                                                               | -      | -     | -                                                                                 | -                                                                                 | -    |
| Stage 2                  | 407                                                                               | -      | -     | -                                                                                 | -                                                                                 | -    |
| Platoon blocked, %       |                                                                                   |        |       | -                                                                                 | -                                                                                 | -    |
| Mov Cap-1 Maneuver       | 97                                                                                | 362    | 798   | -                                                                                 | -                                                                                 | -    |
| Mov Cap-2 Maneuver       | 97                                                                                | -      | -     | -                                                                                 | -                                                                                 | -    |
| Stage 1                  | 420                                                                               | -      | -     | -                                                                                 | -                                                                                 | -    |
| Stage 2                  | 404                                                                               | -      | -     | -                                                                                 | -                                                                                 | -    |
| Approach                 |                                                                                   |        |       |                                                                                   |                                                                                   |      |
|                          | EB                                                                                | NB     |       | SB                                                                                |                                                                                   |      |
| HCM Control Delay, s     | 43.7                                                                              | 0      |       | 0                                                                                 |                                                                                   |      |
| HCM LOS                  | E                                                                                 |        |       |                                                                                   |                                                                                   |      |
| Minor Lane/Major Mvmt    |                                                                                   |        |       |                                                                                   |                                                                                   |      |
|                          | NBL                                                                               | NBT    | EBLn1 | SBT                                                                               | SBR                                                                               |      |
| Capacity (veh/h)         | 798                                                                               | -      | 97    | -                                                                                 | -                                                                                 |      |
| HCM Lane V/C Ratio       | -                                                                                 | -      | 0.041 | -                                                                                 | -                                                                                 |      |
| HCM Control Delay (s)    | 0                                                                                 | -      | 43.7  | -                                                                                 | -                                                                                 |      |
| HCM Lane LOS             | A                                                                                 | -      | E     | -                                                                                 | -                                                                                 |      |
| HCM 95th %tile Q(veh)    | 0                                                                                 | -      | 0.1   | -                                                                                 | -                                                                                 |      |

12239.00 :: Needham Street  
8: Needham Street & Middle Site Driveway/TJMaxx Driveway

2018 Existing Conditions  
Timing Plan: Saturday MIDDAY

| Intersection             |        |      |      |       |       |      |      |        |      |        |       |      |   |
|--------------------------|--------|------|------|-------|-------|------|------|--------|------|--------|-------|------|---|
| Int Delay, s/veh         | 2.5    |      |      |       |       |      |      |        |      |        |       |      |   |
| Movement                 | EBL    | EBT  | EBR  | WBL   | WBT   | WBR  | NBL  | NBT    | NBR  | SBL    | SBT   | SBR  |   |
| Lane Configurations      |        | ↔    |      |       |       |      | ↔    | ↔      |      | ↔      | ↔     |      |   |
| Traffic Vol, veh/h       | 10     | 0    | 110  | 5     | 0     | 10   | 100  | 735    | 10   | 10     | 680   | 10   |   |
| Future Vol, veh/h        | 10     | 0    | 110  | 5     | 0     | 10   | 100  | 735    | 10   | 10     | 680   | 10   |   |
| Conflicting Peds, #/hr   | 1      | 0    | 0    | 0     | 0     | 1    | 8    | 0      | 7    | 7      | 0     | 8    |   |
| Sign Control             | Stop   | Stop | Stop | Stop  | Stop  | Stop | Free | Free   | Free | Free   | Free  | Free |   |
| RT Channelized           | -      | -    | None | -     | -     | None | -    | -      | None | -      | -     | None |   |
| Storage Length           | -      | -    | -    | -     | -     | -    | 120  | -      | -    | 80     | -     | -    |   |
| Veh in Median Storage, # | -      | 0    | -    | -     | -     | -    | 0    | -      | -    | 0      | -     | -    |   |
| Grade, %                 | -      | 0    | -    | -     | 0     | -    | -    | 0      | -    | -      | 0     | -    |   |
| Peak Hour Factor         | 92     | 92   | 92   | 69    | 69    | 69   | 95   | 95     | 95   | 92     | 92    | 92   |   |
| Heavy Vehicles, %        | 0      | 0    | 0    | 0     | 0     | 0    | 0    | 0      | 0    | 1      | 1     | 1    |   |
| Mvmt Flow                | 11     | 0    | 120  | 7     | 0     | 14   | 105  | 774    | 11   | 11     | 739   | 11   |   |
| Major/Minor              |        |      |      |       |       |      |      |        |      |        |       |      |   |
|                          | Minor2 |      |      |       |       |      |      | Major1 |      | Major2 |       |      |   |
| Conflicting Flow All     | 1764   | 1776 | 753  |       |       |      |      | 758    | 0    | 0      | 791   | 0    | 0 |
| Stage 1                  | 774    | 774  | -    |       |       |      |      | -      | -    | -      | -     | -    | - |
| Stage 2                  | 990    | 1002 | -    |       |       |      |      | -      | -    | -      | -     | -    | - |
| Critical Hdwy            | 6.4    | 6.5  | 6.2  |       |       |      |      | 4.1    | -    | -      | 4.11  | -    | - |
| Critical Hdwy Stg 1      | 5.4    | 5.5  | -    |       |       |      |      | -      | -    | -      | -     | -    | - |
| Critical Hdwy Stg 2      | 5.4    | 5.5  | -    |       |       |      |      | -      | -    | -      | -     | -    | - |
| Follow-up Hdwy           | 3.5    | 4    | 3.3  |       |       |      |      | 2.2    | -    | -      | 2.209 | -    | - |
| Pot Cap-1 Maneuver       | 93     | 84   | 413  |       |       |      |      | 862    | -    | -      | 834   | -    | - |
| Stage 1                  | 458    | 411  | -    |       |       |      |      | -      | -    | -      | -     | -    | - |
| Stage 2                  | 363    | 323  | -    |       |       |      |      | -      | -    | -      | -     | -    | - |
| Platoon blocked, %       | -      | -    | -    |       |       |      |      | -      | -    | -      | -     | -    | - |
| Mov Cap-1 Maneuver       | 80     | 0    | 410  |       |       |      |      | 862    | -    | -      | 833   | -    | - |
| Mov Cap-2 Maneuver       | 80     | 0    | -    |       |       |      |      | -      | -    | -      | -     | -    | - |
| Stage 1                  | 449    | 0    | -    |       |       |      |      | -      | -    | -      | -     | -    | - |
| Stage 2                  | 317    | 0    | -    |       |       |      |      | -      | -    | -      | -     | -    | - |
| Approach                 |        |      |      |       |       |      |      |        |      |        |       |      |   |
|                          | EB     |      |      |       |       |      |      | NB     |      | SB     |       |      |   |
| HCM Control Delay, s     | 25.3   |      |      |       |       |      |      | 1.2    |      | 0.1    |       |      |   |
| HCM LOS                  | D      |      |      |       |       |      |      |        |      |        |       |      |   |
| Minor Lane/Major Mvmt    |        |      |      |       |       |      |      |        |      |        |       |      |   |
|                          | NBL    | NBT  | NBR  | EBLn1 | SBL   | SBT  | SBR  |        |      |        |       |      |   |
| Capacity (veh/h)         | 862    | -    | -    | 305   | 833   | -    | -    |        |      |        |       |      |   |
| HCM Lane V/C Ratio       | 0.122  | -    | -    | 0.428 | 0.013 | -    | -    |        |      |        |       |      |   |
| HCM Control Delay (s)    | 9.8    | -    | -    | 25.3  | 9.4   | -    | -    |        |      |        |       |      |   |
| HCM Lane LOS             | A      | -    | -    | D     | A     | -    | -    |        |      |        |       |      |   |
| HCM 95th %ile Q(veh)     | 0.4    | -    | -    | 2     | 0     | -    | -    |        |      |        |       |      |   |

12239.00 :: Needham Street  
9: Needham Street & North Site Driveway/Charlemont Street

2018 Existing Conditions  
Timing Plan: Saturday Midday

| Intersection                                                                                                         |        |      |        |       |        |       |        |      |      |       |      |      |
|----------------------------------------------------------------------------------------------------------------------|--------|------|--------|-------|--------|-------|--------|------|------|-------|------|------|
| Int Delay, s/veh                                                                                                     | 18.8   |      |        |       |        |       |        |      |      |       |      |      |
| Movement                                                                                                             | EBL    | EBT  | EBR    | WBL   | WBT    | WBR   | NBL    | NBT  | NBR  | SBL   | SBT  | SBR  |
| Lane Configurations                                                                                                  |        | ↕    |        |       | ↕      |       | ↕      | ↕    |      | ↕     | ↕    |      |
| Traffic Vol, veh/h                                                                                                   | 70     | 0    | 40     | 45    | 2      | 30    | 25     | 710  | 20   | 10    | 615  | 80   |
| Future Vol, veh/h                                                                                                    | 70     | 0    | 40     | 45    | 2      | 30    | 25     | 710  | 20   | 10    | 615  | 80   |
| Conflicting Peds, #/hr                                                                                               | 0      | 0    | 0      | 0     | 0      | 0     | 7      | 0    | 8    | 8     | 0    | 7    |
| Sign Control                                                                                                         | Stop   | Stop | Stop   | Stop  | Stop   | Stop  | Free   | Free | Free | Free  | Free | Free |
| RT Channelized                                                                                                       | -      | -    | None   | -     | -      | None  | -      | -    | None | -     | -    | None |
| Storage Length                                                                                                       | -      | -    | -      | -     | -      | -     | 80     | -    | -    | 230   | -    | -    |
| Veh in Median Storage, #                                                                                             | -      | 0    | -      | -     | 0      | -     | -      | 0    | -    | -     | 0    | -    |
| Grade, %                                                                                                             | -      | 0    | -      | -     | 0      | -     | -      | 0    | -    | -     | 0    | -    |
| Peak Hour Factor                                                                                                     | 91     | 91   | 91     | 85    | 85     | 85    | 93     | 93   | 93   | 93    | 93   | 93   |
| Heavy Vehicles, %                                                                                                    | 0      | 0    | 0      | 0     | 0      | 0     | 0      | 0    | 0    | 1     | 1    | 1    |
| Mvmt Flow                                                                                                            | 77     | 0    | 44     | 53    | 2      | 35    | 27     | 763  | 22   | 11    | 661  | 86   |
| Major/Minor                                                                                                          | Minor2 |      | Minor1 |       | Major1 |       | Major2 |      |      |       |      |      |
| Conflicting Flow All                                                                                                 | 1580   | 1580 | 711    | 1584  | 1612   | 782   | 754    | 0    | 0    | 793   | 0    | 0    |
| Stage 1                                                                                                              | 733    | 733  | -      | 836   | 836    | -     | -      | -    | -    | -     | -    | -    |
| Stage 2                                                                                                              | 847    | 847  | -      | 748   | 776    | -     | -      | -    | -    | -     | -    | -    |
| Critical Hdwy                                                                                                        | 7.1    | 6.5  | 6.2    | 7.1   | 6.5    | 6.2   | 4.1    | -    | -    | 4.11  | -    | -    |
| Critical Hdwy Stg 1                                                                                                  | 6.1    | 5.5  | -      | 6.1   | 5.5    | -     | -      | -    | -    | -     | -    | -    |
| Critical Hdwy Stg 2                                                                                                  | 6.1    | 5.5  | -      | 6.1   | 5.5    | -     | -      | -    | -    | -     | -    | -    |
| Follow-up Hdwy                                                                                                       | 3.5    | 4    | 3.3    | 3.5   | 4      | 3.3   | 2.2    | -    | -    | 2.209 | -    | -    |
| Pot Cap-1 Maneuver                                                                                                   | 89     | 110  | 436    | 89    | 105    | 397   | 865    | -    | -    | 832   | -    | -    |
| Stage 1                                                                                                              | 415    | 429  | -      | 364   | 385    | -     | -      | -    | -    | -     | -    | -    |
| Stage 2                                                                                                              | 359    | 381  | -      | 408   | 410    | -     | -      | -    | -    | -     | -    | -    |
| Platoon blocked, %                                                                                                   | -      | -    | -      | -     | -      | -     | -      | -    | -    | -     | -    | -    |
| Mov Cap-1 Maneuver                                                                                                   | ~ 76   | 104  | 433    | 77    | 99     | 394   | 865    | -    | -    | 832   | -    | -    |
| Mov Cap-2 Maneuver                                                                                                   | ~ 76   | 104  | -      | 77    | 99     | -     | -      | -    | -    | -     | -    | -    |
| Stage 1                                                                                                              | 400    | 421  | -      | 350   | 370    | -     | -      | -    | -    | -     | -    | -    |
| Stage 2                                                                                                              | 315    | 367  | -      | 362   | 402    | -     | -      | -    | -    | -     | -    | -    |
| Approach                                                                                                             | EB     |      | WB     |       | NB     |       | SB     |      |      |       |      |      |
| HCM Control Delay, s                                                                                                 | 193.3  |      | 108.4  |       | 0.3    |       | 0.1    |      |      |       |      |      |
| HCM LOS                                                                                                              | F      |      | F      |       |        |       |        |      |      |       |      |      |
| Minor Lane/Major Mvmt                                                                                                | NBL    | NBT  | NBR    | EBLn1 | WBLn1  | SBL   | SBT    | SBR  |      |       |      |      |
| Capacity (veh/h)                                                                                                     | 865    | -    | -      | 109   | 113    | 832   | -      | -    |      |       |      |      |
| HCM Lane V/C Ratio                                                                                                   | 0.031  | -    | -      | 1.109 | 0.802  | 0.013 | -      | -    |      |       |      |      |
| HCM Control Delay (s)                                                                                                | 9.3    | -    | -      | 193.3 | 108.4  | 9.4   | -      | -    |      |       |      |      |
| HCM Lane LOS                                                                                                         | A      | -    | -      | F     | F      | A     | -      | -    |      |       |      |      |
| HCM 95th %tile Q(veh)                                                                                                | 0.1    | -    | -      | 7.5   | 4.6    | 0     | -      | -    |      |       |      |      |
| Notes                                                                                                                |        |      |        |       |        |       |        |      |      |       |      |      |
| ~: Volume exceeds capacity    \$: Delay exceeds 300s    +: Computation Not Defined    *: All major volume in platoon |        |      |        |       |        |       |        |      |      |       |      |      |

12239.00 :: Needham Street  
10: Needham Street & Tower Road/Industrial Place

2018 Existing Conditions  
Timing Plan: Saturday Midday

| Intersection                                                                                                          |          |      |        |          |        |       |        |      |      |      |      |      |
|-----------------------------------------------------------------------------------------------------------------------|----------|------|--------|----------|--------|-------|--------|------|------|------|------|------|
| Int Delay, s/veh                                                                                                      | 77.1     |      |        |          |        |       |        |      |      |      |      |      |
| Movement                                                                                                              | EBL      | EBT  | EBR    | WBL      | WBT    | WBR   | NBL    | NBT  | NBR  | SBL  | SBT  | SBR  |
| Lane Configurations                                                                                                   |          | ↕    |        |          | ↕      |       |        | ↕    |      |      | ↕    |      |
| Traffic Vol, veh/h                                                                                                    | 70       | 10   | 85     | 40       | 20     | 55    | 45     | 740  | 20   | 20   | 580  | 35   |
| Future Vol, veh/h                                                                                                     | 70       | 10   | 85     | 40       | 20     | 55    | 45     | 740  | 20   | 20   | 580  | 35   |
| Conflicting Peds, #/hr                                                                                                | 1        | 0    | 5      | 5        | 0      | 1     | 8      | 0    | 10   | 10   | 0    | 8    |
| Sign Control                                                                                                          | Stop     | Stop | Stop   | Stop     | Stop   | Stop  | Free   | Free | Free | Free | Free | Free |
| RT Channelized                                                                                                        | -        | -    | None   | -        | -      | None  | -      | -    | None | -    | -    | None |
| Storage Length                                                                                                        | -        | -    | -      | -        | -      | -     | -      | -    | -    | -    | -    | -    |
| Veh in Median Storage, #                                                                                              | -        | 0    | -      | -        | 0      | -     | -      | 0    | -    | -    | 0    | -    |
| Grade, %                                                                                                              | -        | 0    | -      | -        | 0      | -     | -      | 0    | -    | -    | 0    | -    |
| Peak Hour Factor                                                                                                      | 85       | 85   | 85     | 95       | 95     | 95    | 94     | 94   | 94   | 90   | 90   | 90   |
| Heavy Vehicles, %                                                                                                     | 0        | 0    | 0      | 0        | 0      | 0     | 0      | 0    | 0    | 0    | 0    | 0    |
| Mvmt Flow                                                                                                             | 82       | 12   | 100    | 42       | 21     | 58    | 48     | 787  | 21   | 22   | 644  | 39   |
| Major/Minor                                                                                                           | Minor2   |      | Minor1 |          | Major1 |       | Major2 |      |      |      |      |      |
| Conflicting Flow All                                                                                                  | 1650     | 1630 | 677    | 1673     | 1640   | 809   | 691    | 0    | 0    | 819  | 0    | 0    |
| Stage 1                                                                                                               | 716      | 716  | -      | 904      | 904    | -     | -      | -    | -    | -    | -    | -    |
| Stage 2                                                                                                               | 934      | 914  | -      | 769      | 736    | -     | -      | -    | -    | -    | -    | -    |
| Critical Hdwy                                                                                                         | 7.1      | 6.5  | 6.2    | 7.1      | 6.5    | 6.2   | 4.1    | -    | -    | 4.1  | -    | -    |
| Critical Hdwy Stg 1                                                                                                   | 6.1      | 5.5  | -      | 6.1      | 5.5    | -     | -      | -    | -    | -    | -    | -    |
| Critical Hdwy Stg 2                                                                                                   | 6.1      | 5.5  | -      | 6.1      | 5.5    | -     | -      | -    | -    | -    | -    | -    |
| Follow-up Hdwy                                                                                                        | 3.5      | 4    | 3.3    | 3.5      | 4      | 3.3   | 2.2    | -    | -    | 2.2  | -    | -    |
| Pot Cap-1 Maneuver                                                                                                    | ~ 80     | 103  | 456    | 77       | 101    | 384   | 913    | -    | -    | 818  | -    | -    |
| Stage 1                                                                                                               | 424      | 437  | -      | 334      | 358    | -     | -      | -    | -    | -    | -    | -    |
| Stage 2                                                                                                               | 322      | 355  | -      | 397      | 428    | -     | -      | -    | -    | -    | -    | -    |
| Platoon blocked, %                                                                                                    | -        | -    | -      | -        | -      | -     | -      | -    | -    | -    | -    | -    |
| Mov Cap-1 Maneuver                                                                                                    | ~ 49     | 88   | 451    | 48       | 86     | 380   | 909    | -    | -    | 817  | -    | -    |
| Mov Cap-2 Maneuver                                                                                                    | ~ 49     | 88   | -      | 48       | 86     | -     | -      | -    | -    | -    | -    | -    |
| Stage 1                                                                                                               | 381      | 415  | -      | 299      | 321    | -     | -      | -    | -    | -    | -    | -    |
| Stage 2                                                                                                               | 230      | 318  | -      | 286      | 406    | -     | -      | -    | -    | -    | -    | -    |
| Approach                                                                                                              | EB       |      | WB     |          | NB     |       | SB     |      |      |      |      |      |
| HCM Control Delay, s                                                                                                  | \$ 577.6 |      | 264.4  |          | 0.5    |       | 0.3    |      |      |      |      |      |
| HCM LOS                                                                                                               | F        |      | F      |          |        |       |        |      |      |      |      |      |
| Minor Lane/Major Mvmt                                                                                                 | NBL      | NBT  | NBR    | EBLn1    | WBLn1  | SBL   | SBT    | SBR  |      |      |      |      |
| Capacity (veh/h)                                                                                                      | 909      | -    | -      | 95       | 95     | 817   | -      | -    |      |      |      |      |
| HCM Lane V/C Ratio                                                                                                    | 0.053    | -    | -      | 2.043    | 1.274  | 0.027 | -      | -    |      |      |      |      |
| HCM Control Delay (s)                                                                                                 | 9.2      | 0    | -      | \$ 577.6 | 264.4  | 9.5   | 0      | -    |      |      |      |      |
| HCM Lane LOS                                                                                                          | A        | A    | -      | F        | F      | A     | A      | -    |      |      |      |      |
| HCM 95th %ile Q(veh)                                                                                                  | 0.2      | -    | -      | 16.7     | 8.6    | 0.1   | -      | -    |      |      |      |      |
| Notes                                                                                                                 |          |      |        |          |        |       |        |      |      |      |      |      |
| --: Volume exceeds capacity    \$: Delay exceeds 300s    +: Computation Not Defined    *: All major volume in platoon |          |      |        |          |        |       |        |      |      |      |      |      |

12239.00 :: Needham Street  
11: Needham Street & Jaconnet Street

2018 Existing Conditions  
Timing Plan: Saturday MIDDAY

| Intersection             |        |        |       |        |      |      |
|--------------------------|--------|--------|-------|--------|------|------|
| Int Delay, s/veh         | 1.4    |        |       |        |      |      |
| Movement                 | WBL    | WBR    | NBT   | NBR    | SBL  | SBT  |
| Lane Configurations      | W      |        | T     |        |      | T    |
| Traffic Vol, veh/h       | 25     | 20     | 840   | 30     | 20   | 610  |
| Future Vol, veh/h        | 25     | 20     | 840   | 30     | 20   | 610  |
| Conflicting Peds, #/hr   | 0      | 0      | 0     | 38     | 38   | 0    |
| Sign Control             | Stop   | Stop   | Free  | Free   | Free | Free |
| RT Channelized           | -      | None   | -     | None   | -    | None |
| Storage Length           | 0      | -      | -     | -      | -    | -    |
| Veh in Median Storage, # | 0      | -      | 0     | -      | -    | 0    |
| Grade, %                 | 0      | -      | 0     | -      | -    | 0    |
| Peak Hour Factor         | 92     | 92     | 96    | 96     | 90   | 90   |
| Heavy Vehicles, %        | 0      | 0      | 0     | 0      | 0    | 0    |
| Mvmt Flow                | 27     | 22     | 875   | 31     | 22   | 678  |
|                          |        |        |       |        |      |      |
| Major/Minor              | Minor1 | Major1 |       | Major2 |      |      |
| Conflicting Flow All     | 1651   | 929    | 0     | 0      | 944  | 0    |
| Stage 1                  | 929    | -      | -     | -      | -    | -    |
| Stage 2                  | 722    | -      | -     | -      | -    | -    |
| Critical Hdwy            | 6.4    | 6.2    | -     | -      | 4.1  | -    |
| Critical Hdwy Stg 1      | 5.4    | -      | -     | -      | -    | -    |
| Critical Hdwy Stg 2      | 5.4    | -      | -     | -      | -    | -    |
| Follow-up Hdwy           | 3.5    | 3.3    | -     | -      | 2.2  | -    |
| Pot Cap-1 Maneuver       | 110    | 327    | -     | -      | 735  | -    |
| Stage 1                  | 388    | -      | -     | -      | -    | -    |
| Stage 2                  | 485    | -      | -     | -      | -    | -    |
| Platoon blocked, %       |        |        | -     | -      | -    | -    |
| Mov Cap-1 Maneuver       | 101    | 317    | -     | -      | 735  | -    |
| Mov Cap-2 Maneuver       | 101    | -      | -     | -      | -    | -    |
| Stage 1                  | 376    | -      | -     | -      | -    | -    |
| Stage 2                  | 462    | -      | -     | -      | -    | -    |
|                          |        |        |       |        |      |      |
| Approach                 | WB     | NB     |       | SB     |      |      |
| HCM Control Delay, s     | 42     | 0      |       | 0.3    |      |      |
| HCM LOS                  | E      |        |       |        |      |      |
|                          |        |        |       |        |      |      |
| Minor Lane/Major Mvmt    | NBT    | NBR    | WBLn1 | SBL    | SBT  |      |
| Capacity (veh/h)         | -      | -      | 145   | 735    | -    |      |
| HCM Lane V/C Ratio       | -      | -      | 0.337 | 0.03   | -    |      |
| HCM Control Delay (s)    | -      | -      | 42    | 10.1   | 0    |      |
| HCM Lane LOS             | -      | -      | E     | B      | A    |      |
| HCM 95th %tile Q(veh)    | -      | -      | 1.4   | 0.1    | -    |      |

12239.00 :: Needham Street  
12: Needham Street & Rockland Street

2018 Existing Conditions  
Timing Plan: Saturday MIDDAY

| Intersection             |        |        |       |        |      |      |
|--------------------------|--------|--------|-------|--------|------|------|
| Int Delay, s/veh         | 0.9    |        |       |        |      |      |
| Movement                 | WBL    | WBR    | NBT   | NBR    | SBL  | SBT  |
| Lane Configurations      | W      |        | T     |        | T    | T    |
| Traffic Vol, veh/h       | 15     | 15     | 830   | 30     | 20   | 615  |
| Future Vol, veh/h        | 15     | 15     | 830   | 30     | 20   | 615  |
| Conflicting Peds, #/hr   | 0      | 1      | 0     | 18     | 18   | 0    |
| Sign Control             | Stop   | Stop   | Free  | Free   | Free | Free |
| RT Channelized           | -      | None   | -     | None   | -    | None |
| Storage Length           | 0      | -      | -     | -      | 125  | -    |
| Veh in Median Storage, # | 0      | -      | 0     | -      | -    | 0    |
| Grade, %                 | 0      | -      | 0     | -      | -    | 0    |
| Peak Hour Factor         | 83     | 83     | 96    | 96     | 89   | 89   |
| Heavy Vehicles, %        | 0      | 0      | 0     | 0      | 0    | 0    |
| Mvmt Flow                | 18     | 18     | 865   | 31     | 22   | 691  |
| Major/Minor              |        |        |       |        |      |      |
|                          | Minor1 | Major1 |       | Major2 |      |      |
| Conflicting Flow All     | 1634   | 899    | 0     | 0      | 914  | 0    |
| Stage 1                  | 898    | -      | -     | -      | -    | -    |
| Stage 2                  | 736    | -      | -     | -      | -    | -    |
| Critical Hdwy            | 6.4    | 6.2    | -     | -      | 4.1  | -    |
| Critical Hdwy Stg 1      | 5.4    | -      | -     | -      | -    | -    |
| Critical Hdwy Stg 2      | 5.4    | -      | -     | -      | -    | -    |
| Follow-up Hdwy           | 3.5    | 3.3    | -     | -      | 2.2  | -    |
| Pot Cap-1 Maneuver       | 112    | 340    | -     | -      | 754  | -    |
| Stage 1                  | 401    | -      | -     | -      | -    | -    |
| Stage 2                  | 477    | -      | -     | -      | -    | -    |
| Platoon blocked, %       |        |        | -     | -      | -    | -    |
| Mov Cap-1 Maneuver       | 107    | 335    | -     | -      | 753  | -    |
| Mov Cap-2 Maneuver       | 107    | -      | -     | -      | -    | -    |
| Stage 1                  | 395    | -      | -     | -      | -    | -    |
| Stage 2                  | 463    | -      | -     | -      | -    | -    |
| Approach                 |        |        |       |        |      |      |
|                          | WB     | NB     |       | SB     |      |      |
| HCM Control Delay, s     | 33.5   | 0      |       | 0.3    |      |      |
| HCM LOS                  | D      |        |       |        |      |      |
| Minor Lane/Major Mvmt    |        |        |       |        |      |      |
|                          | NBT    | NBR    | WBLn1 | SBL    | SBT  |      |
| Capacity (veh/h)         | -      | -      | 162   | 753    | -    |      |
| HCM Lane V/C Ratio       | -      | -      | 0.223 | 0.03   | -    |      |
| HCM Control Delay (s)    | -      | -      | 33.5  | 9.9    | -    |      |
| HCM Lane LOS             | -      | -      | D     | A      | -    |      |
| HCM 95th %ile Q(veh)     | -      | -      | 0.8   | 0.1    | -    |      |

12239.00 :: Needham Street  
13: Needham Street & Avalon Driveway/Columbia Avenue

2018 Existing Conditions  
Timing Plan: Saturday MIDDAY

| Lane Group              | EBL   | EBT   | EBR   | WBL   | WBT   | WBR   | NBL   | NBT   | NBR  | SBL   | SBT   | SBR  |
|-------------------------|-------|-------|-------|-------|-------|-------|-------|-------|------|-------|-------|------|
| Lane Configurations     |       | EBT   | EBR   | WBL   | WBT   | WBR   | NBL   | NBT   | NBR  | SBL   | SBT   | SBR  |
| Traffic Volume (vph)    | 10    | 0     | 10    | 10    | 2     | 10    | 10    | 825   | 10   | 5     | 615   | 5    |
| Future Volume (vph)     | 10    | 0     | 10    | 10    | 2     | 10    | 10    | 825   | 10   | 5     | 615   | 5    |
| Ideal Flow (vphpl)      | 1900  | 1900  | 1900  | 1900  | 1900  | 1900  | 1900  | 1900  | 1900 | 1900  | 1900  | 1900 |
| Storage Length (ft)     | 0     |       | 50    | 0     |       | 0     | 125   | 0     |      | 560   | 0     |      |
| Storage Lanes           | 0     |       | 1     | 0     |       | 0     | 1     | 0     |      | 1     | 0     |      |
| Taper Length (ft)       | 25    |       |       | 25    |       |       | 25    |       |      | 25    |       |      |
| Satd. Flow (prot)       | 0     | 1805  | 1615  | 0     | 1714  | 0     | 1805  | 1895  | 0    | 1805  | 1897  | 0    |
| Flt Permitted           |       |       |       |       |       | 0.344 |       | 0.235 |      |       |       |      |
| Satd. Flow (perm)       | 0     | 1874  | 1615  | 0     | 1754  | 0     | 648   | 1895  | 0    | 444   | 1897  | 0    |
| Right Turn on Red       |       | Yes   |       |       | Yes   |       |       | Yes   |      |       | Yes   |      |
| Satd. Flow (RTOR)       |       | 43    |       |       | 12    |       |       | 2     |      |       | 2     |      |
| Link Speed (mph)        |       | 30    |       |       | 30    |       |       | 30    |      |       | 30    |      |
| Link Distance (ft)      |       | 190   |       |       | 435   |       |       | 338   |      |       | 1135  |      |
| Travel Time (s)         |       | 4.3   |       |       | 9.9   |       |       | 7.7   |      |       | 25.8  |      |
| Confl. Peds. (#/hr)     | 6     |       |       |       |       | 6     | 11    |       | 12   | 12    |       | 11   |
| Confl. Bikes (#/hr)     |       |       |       |       |       |       |       | 2     |      |       |       | 1    |
| Peak Hour Factor        | 0.68  | 0.68  | 0.68  | 0.82  | 0.82  | 0.82  | 0.96  | 0.96  | 0.96 | 0.88  | 0.88  | 0.88 |
| Heavy Vehicles (%)      | 0%    | 0%    | 0%    | 0%    | 0%    | 0%    | 0%    | 0%    | 0%   | 0%    | 0%    | 0%   |
| Shared Lane Traffic (%) |       |       |       |       |       |       |       |       |      |       |       |      |
| Lane Group Flow (vph)   | 0     | 15    | 15    | 0     | 26    | 0     | 10    | 869   | 0    | 6     | 705   | 0    |
| Turn Type               | Perm  | NA    | Perm  | Perm  | NA    | Perm  | NA    | Perm  | NA   | Perm  | NA    | Free |
| Protected Phases        |       | 8     |       | 4     |       |       | 2     |       |      | 6     |       |      |
| Permitted Phases        | 8     |       | 8     | 4     |       |       | 2     |       |      | 6     |       |      |
| Detector Phase          | 8     | 8     | 8     | 4     | 4     |       | 2     | 2     |      | 6     | 6     |      |
| Switch Phase            |       |       |       |       |       |       |       |       |      |       |       |      |
| Minimum Initial (s)     | 4.0   | 4.0   | 4.0   | 4.0   | 4.0   |       | 10.0  | 10.0  |      | 10.0  | 10.0  |      |
| Minimum Split (s)       | 25.0  | 25.0  | 25.0  | 22.0  | 22.0  |       | 17.0  | 17.0  |      | 23.0  | 23.0  |      |
| Total Split (s)         | 12.0  | 12.0  | 12.0  | 12.0  | 12.0  |       | 65.0  | 65.0  |      | 65.0  | 65.0  |      |
| Total Split (%)         | 15.6% | 15.6% | 15.6% | 15.6% | 15.6% |       | 84.4% | 84.4% |      | 84.4% | 84.4% |      |
| Yellow Time (s)         | 4.0   | 4.0   | 4.0   | 4.0   | 4.0   |       | 4.0   | 4.0   |      | 4.0   | 4.0   |      |
| All-Red Time (s)        | 2.0   | 2.0   | 2.0   | 2.0   | 2.0   |       | 2.0   | 2.0   |      | 2.0   | 2.0   |      |
| Lost Time Adjust (s)    | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   |       | 0.0   | 0.0   |      | 0.0   | 0.0   |      |
| Total Lost Time (s)     | 6.0   | 6.0   | 6.0   | 6.0   | 6.0   |       | 6.0   | 6.0   |      | 6.0   | 6.0   |      |
| Lead/Lag                |       |       |       |       |       |       |       |       |      |       |       |      |
| Lead-Lag Optimize?      |       |       |       |       |       |       |       |       |      |       |       |      |
| Recall Mode             | None  | None  | None  | None  | None  |       | None  | None  |      | None  | None  |      |
| Act Effect Green (s)    | 7.8   | 7.8   | 7.8   | 7.8   | 7.8   |       | 31.2  | 31.2  |      | 31.2  | 31.2  |      |
| Actuated g/C Ratio      | 0.21  | 0.21  | 0.21  | 0.21  | 0.21  |       | 0.86  | 0.86  |      | 0.86  | 0.86  |      |
| v/c Ratio               | 0.04  | 0.04  | 0.04  | 0.07  | 0.07  |       | 0.02  | 0.54  |      | 0.02  | 0.43  |      |
| Control Delay           | 20.9  | 1.6   | 1.6   | 16.4  | 16.4  |       | 3.9   | 6.0   |      | 4.0   | 4.8   |      |
| Queue Delay             | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   |       | 0.0   | 0.0   |      | 0.0   | 0.0   |      |
| Total Delay             | 20.9  | 1.6   | 1.6   | 16.4  | 16.4  |       | 3.9   | 6.0   |      | 4.0   | 4.8   |      |
| LOS                     | C     | A     | A     | B     | B     |       | A     | A     |      | A     | A     |      |
| Approach Delay          | 11.3  |       |       | 16.4  |       |       | 6.0   |       |      | 4.8   |       |      |
| Approach LOS            | B     |       |       | B     |       |       | A     |       |      | A     |       |      |
| Queue Length 50th (ft)  | 1     | 0     | 1     |       |       |       | 0     | 0     |      | 0     | 0     |      |
| Queue Length 95th (ft)  | 16    | 0     | 23    |       |       |       | 7     | 378   |      | 5     | 248   |      |
| Internal Link Dist (ft) | 110   |       |       | 355   |       |       | 258   |       |      | 1055  |       |      |
| Turn Bay Length (ft)    |       | 50    |       |       |       |       | 125   |       |      | 560   |       |      |
| Base Capacity (vph)     | 498   | 461   |       | 475   |       |       | 613   | 1792  |      | 420   | 1794  |      |
| Starvation Cap Reductn  | 0     | 0     | 0     | 0     | 0     |       | 0     | 0     |      | 0     | 0     |      |
| Spillback Cap Reductn   | 0     | 0     | 0     | 0     | 0     |       | 0     | 0     |      | 0     | 0     |      |
| Storage Cap Reductn     | 0     | 0     | 0     | 0     | 0     |       | 0     | 0     |      | 0     | 0     |      |
| Reduced v/c Ratio       | 0.03  | 0.03  |       | 0.05  |       |       | 0.02  | 0.48  |      | 0.01  | 0.39  |      |

|                                         |                        |
|-----------------------------------------|------------------------|
| Intersection Summary                    |                        |
| Area Type:                              | Other                  |
| Cycle Length: 77                        |                        |
| Actuated Cycle Length: 36.4             |                        |
| Natural Cycle: 60                       |                        |
| Control Type: Actuated-Uncoordinated    |                        |
| Maximum v/c Ratio: 0.54                 |                        |
| Intersection Signal Delay: 5.8          | Intersection LOS: A    |
| Intersection Capacity Utilization 63.2% | ICU Level of Service B |
| Analysis Period (min) 15                |                        |

Splits and Phases: 13: Needham Street & Avalon Driveway/Columbia Avenue



VHB/MSD

07/03/2018

12239.00 :: Needham Street  
14: Winchester Street & Needham Street/Dedham Street

2018 Existing Conditions  
Timing Plan: Saturday MIDDAY

| Lane Group              | EBL   | EBT   | EBR   | WBL   | WBT   | WBR  | NBL   | NBT   | NBR  | SBL   | SBT   | SBR  | Ø9 |
|-------------------------|-------|-------|-------|-------|-------|------|-------|-------|------|-------|-------|------|----|
| Lane Configurations     |       | EBT   | EBR   | WBL   | WBT   | WBR  | NBL   | NBT   | NBR  | SBL   | SBT   | SBR  |    |
| Traffic Volume (vph)    | 650   | 125   | 70    | 20    | 125   | 85   | 35    | 200   | 10   | 50    | 195   | 470  |    |
| Future Volume (vph)     | 650   | 125   | 70    | 20    | 125   | 85   | 35    | 200   | 10   | 50    | 195   | 470  |    |
| Ideal Flow (vphpl)      | 1900  | 1900  | 1900  | 1900  | 1900  | 1900 | 1900  | 1900  | 1900 | 1900  | 1900  | 1900 |    |
| Storage Length (ft)     | 340   |       | 75    | 0     |       | 0    | 50    | 0     |      | 0     | 0     | 0    |    |
| Storage Lanes           | 1     |       | 1     | 0     |       | 0    | 0     | 0     |      | 0     | 0     | 1    |    |
| Taper Length (ft)       | 25    |       |       | 25    |       |      | 25    |       |      | 25    |       |      |    |
| Satd. Flow (prot)       | 1715  | 1745  | 1615  | 0     | 1770  | 0    | 0     | 1873  | 0    | 0     | 1862  | 1599 |    |
| Flt Permitted           | 0.950 | 0.967 |       |       | 0.345 |      |       | 0.605 |      |       | 0.696 |      |    |
| Satd. Flow (perm)       | 1690  | 1728  | 1566  | 0     | 613   | 0    | 0     | 1141  | 0    | 0     | 1308  | 1563 |    |
| Right Turn on Red       |       | Yes   |       |       | No    |      |       | Yes   |      |       | Yes   |      |    |
| Satd. Flow (RTOR)       |       | 98    |       |       |       |      |       | 2     |      |       | 30    | 522  |    |
| Link Speed (mph)        |       | 30    |       |       | 30    |      |       | 30    |      |       | 30    |      |    |
| Link Distance (ft)      |       | 1135  |       |       | 451   |      |       | 634   |      |       | 722   |      |    |
| Travel Time (s)         |       | 25.8  |       |       | 10.3  |      |       | 14.4  |      |       | 16.4  |      |    |
| Confl. Peds. (#/hr)     | 8     |       | 4     | 4     |       | 8    | 4     |       | 5    | 5     |       | 4    |    |
| Confl. Bikes (#/hr)     |       |       |       |       |       |      |       | 1     |      |       |       | 1    |    |
| Peak Hour Factor        | 0.96  | 0.96  | 0.96  | 0.95  | 0.95  | 0.95 | 0.91  | 0.91  | 0.91 | 0.90  | 0.90  | 0.90 |    |
| Heavy Vehicles (%)      | 0%    | 0%    | 0%    | 0%    | 0%    | 0%   | 0%    | 0%    | 0%   | 1%    | 1%    | 1%   |    |
| Shared Lane Traffic (%) | 41%   |       |       |       |       |      |       |       |      |       |       |      |    |
| Lane Group Flow (vph)   | 399   | 408   | 73    | 0     | 242   | 0    | 0     | 269   | 0    | 0     | 273   | 522  |    |
| Turn Type               | Split | NA    | Perm  | Perm  | NA    | Perm | NA    | Perm  | NA   | Perm  | NA    | Free |    |
| Protected Phases        | 6     | 6     |       |       | 2     |      |       | 8     |      | 4     |       | 9    |    |
| Permitted Phases        |       |       | 6     | 2     |       |      | 8     |       |      | 4     |       | Free |    |
| Detector Phase          | 6     | 6     | 6     | 2     | 2     |      | 8     | 8     |      | 4     | 4     |      |    |
| Switch Phase            |       |       |       |       |       |      |       |       |      |       |       |      |    |
| Minimum Initial (s)     | 10.0  | 10.0  | 10.0  | 6.0   | 6.0   |      | 6.0   | 6.0   |      | 6.0   | 6.0   | 7.0  |    |
| Minimum Split (s)       | 19.0  | 19.0  | 19.0  | 19.0  | 19.0  |      | 21.0  | 21.0  |      | 21.0  | 21.0  | 24.0 |    |
| Total Split (s)         | 35.0  | 35.0  | 35.0  | 31.0  | 31.0  |      | 54.0  | 54.0  |      | 54.0  | 54.0  | 24.0 |    |
| Total Split (%)         | 24.3% | 24.3% | 24.3% | 21.5% | 21.5% |      | 37.5% | 37.5% |      | 37.5% | 37.5% | 17%  |    |
| Yellow Time (s)         | 4.0   | 4.0   | 4.0   | 3.0   | 3.0   |      | 4.0   | 4.0   |      | 4.0   | 4.0   | 3.0  |    |
| All-Red Time (s)        | 3.0   | 3.0   | 3.0   | 3.0   | 3.0   |      | 3.0   | 3.0   |      | 3.0   | 3.0   | 0.0  |    |
| Lost Time Adjust (s)    | 0.0   | 0.0   | 0.0   |       | 0.0   |      |       | 0.0   |      |       | 0.0   |      |    |
| Total Lost Time (s)     | 7.0   | 7.0   | 7.0   |       | 6.0   |      |       | 7.0   |      |       | 7.0   |      |    |
| Lead/Lag                |       |       |       |       |       |      |       |       |      |       |       |      |    |
| Lead-Lag Optimize?      |       |       |       |       |       |      |       |       |      |       |       |      |    |
| Recall Mode             | C-Min | C-Min | C-Min | Min   | Min   |      | None  | None  |      | None  | None  | None |    |
| Act Effect Green (s)    | 28.0  | 28.0  | 28.0  |       | 51.0  |      |       | 30.6  |      | 30.6  | 144.0 |      |    |
| Actuated g/C Ratio      | 0.19  | 0.19  | 0.19  |       | 0.35  |      |       | 0.21  |      | 0.21  | 1.00  |      |    |
| v/c Ratio               | 1.20  | 1.20  | 0.19  |       | 1.12  |      |       | 1.10  |      | 0.98  | 0.33  |      |    |
| Control Delay           | 163.0 | 164.5 | 5.0   |       | 139.2 |      |       | 138.7 |      | 105.3 | 0.6   |      |    |
| Queue Delay             | 0.0   | 0.0   | 0.0   |       | 0.0   |      |       | 0.0   |      | 0.0   | 0.0   |      |    |
| Total Delay             | 163.0 | 164.5 | 5.0   |       | 139.2 |      |       | 138.7 |      | 105.3 | 0.6   |      |    |
| LOS                     | F     | F     | A     |       | F     |      |       | F     |      | F     | A     |      |    |
| Approach Delay          | 150.6 |       |       |       | 139.2 |      |       | 138.7 |      | 36.5  |       |      |    |
| Approach LOS            | F     |       |       |       | F     |      |       | F     |      | D     |       |      |    |
| Queue Length 50th (ft)  | ~475  | ~488  | 0     |       | ~300  |      |       | ~284  |      | 257   | 0     |      |    |
| Queue Length 95th (ft)  | #696  | #711  | 24    |       | #517  |      |       | #396  |      | #350  | 0     |      |    |
| Internal Link Dist (ft) |       | 1055  |       |       | 371   |      |       | 554   |      | 642   |       |      |    |
| Turn Bay Length (ft)    | 340   |       | 75    |       |       |      |       |       |      |       |       |      |    |
| Base Capacity (vph)     | 333   | 339   | 383   |       | 216   |      |       | 373   |      | 426   | 1563  |      |    |
| Starvation Cap Reductn  | 0     | 0     | 0     |       | 0     |      |       | 0     |      | 0     | 0     |      |    |
| Spillback Cap Reductn   | 0     | 0     | 0     |       | 0     |      |       | 0     |      | 0     | 0     |      |    |
| Storage Cap Reductn     | 0     | 0     | 0     |       | 0     |      |       | 0     |      | 0     | 0     |      |    |
| Reduced v/c Ratio       | 1.20  | 1.20  | 0.19  |       | 1.12  |      |       | 0.72  |      | 0.64  | 0.33  |      |    |

|                                                               |                        |
|---------------------------------------------------------------|------------------------|
| Intersection Summary                                          |                        |
| Area Type:                                                    | Other                  |
| Cycle Length: 144                                             |                        |
| Actuated Cycle Length: 144                                    |                        |
| Offset: 113 (78%), Referenced to phase 6:EBTL, Start of Green |                        |
| Natural Cycle: 145                                            |                        |
| Control Type: Actuated-Coordinated                            |                        |
| Maximum v/c Ratio: 1.20                                       |                        |
| Intersection Signal Delay: 106.4                              | Intersection LOS: F    |
| Intersection Capacity Utilization 83.1%                       | ICU Level of Service E |
| Analysis Period (min) 15                                      |                        |

~ Volume exceeds capacity, queue is theoretically infinite.

Queue shown is maximum after two cycles.

# 95th percentile volume exceeds capacity, queue may be longer.

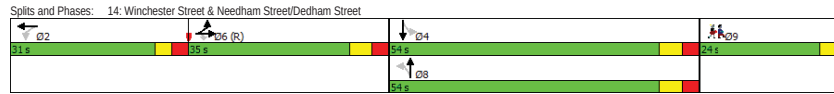
Queue shown is maximum after two cycles.

Lanes, Volumes, Timings  
VHB/MSD

\\vnb\proj\Wat-LD\12239.00\tech\Traffic\Synchro\TIA\_2018\2018 EX\_SAT.syn  
07/03/2018

12239.00 :: Needham Street  
14: Winchester Street & Needham Street/Dedham Street

2018 Existing Conditions  
Timing Plan: Saturday MIDDAY



12239.00 :: Needham Street  
15: Winchester Street & Route 9 EB Access Road

2018 Existing Conditions  
Timing Plan: Saturday MIDDAY

| Intersection                                                                                                         |          |        |          |        |      |      |  |  |
|----------------------------------------------------------------------------------------------------------------------|----------|--------|----------|--------|------|------|--|--|
| Int Delay, s/veh                                                                                                     | 96.8     |        |          |        |      |      |  |  |
| Movement                                                                                                             | WBL      | WBR    | NBT      | NBR    | SBL  | SBT  |  |  |
| Lane Configurations                                                                                                  | W        |        | R        |        |      | L    |  |  |
| Traffic Vol, veh/h                                                                                                   | 85       | 195    | 650      | 285    | 135  | 630  |  |  |
| Future Vol, veh/h                                                                                                    | 85       | 195    | 650      | 285    | 135  | 630  |  |  |
| Conflicting Peds, #/hr                                                                                               | 0        | 0      | 0        | 1      | 1    | 0    |  |  |
| Sign Control                                                                                                         | Stop     | Stop   | Free     | Free   | Free | Free |  |  |
| RT Channelized                                                                                                       | -        | None   | -        | None   | -    | None |  |  |
| Storage Length                                                                                                       | 0        | -      | -        | -      | -    | -    |  |  |
| Veh in Median Storage, #                                                                                             | 0        | -      | 0        | -      | -    | 0    |  |  |
| Grade, %                                                                                                             | 0        | -      | 0        | -      | -    | 0    |  |  |
| Peak Hour Factor                                                                                                     | 95       | 95     | 94       | 94     | 86   | 86   |  |  |
| Heavy Vehicles, %                                                                                                    | 0        | 0      | 0        | 0      | 0    | 0    |  |  |
| Mvmt Flow                                                                                                            | 89       | 205    | 691      | 303    | 157  | 733  |  |  |
|                                                                                                                      |          |        |          |        |      |      |  |  |
| Major/Minor                                                                                                          | Minor1   | Major1 |          | Major2 |      |      |  |  |
| Conflicting Flow All                                                                                                 | 1891     | 844    | 0        | 0      | 996  | 0    |  |  |
| Stage 1                                                                                                              | 844      | -      | -        | -      | -    | -    |  |  |
| Stage 2                                                                                                              | 1047     | -      | -        | -      | -    | -    |  |  |
| Critical Hdwy                                                                                                        | 6.4      | 6.2    | -        | -      | 4.1  | -    |  |  |
| Critical Hdwy Stg 1                                                                                                  | 5.4      | -      | -        | -      | -    | -    |  |  |
| Critical Hdwy Stg 2                                                                                                  | 5.4      | -      | -        | -      | -    | -    |  |  |
| Follow-up Hdwy                                                                                                       | 3.5      | 3.3    | -        | -      | 2.2  | -    |  |  |
| Pot Cap-1 Maneuver                                                                                                   | ~ 78     | 366    | -        | -      | 703  | -    |  |  |
| Stage 1                                                                                                              | 425      | -      | -        | -      | -    | -    |  |  |
| Stage 2                                                                                                              | 341      | -      | -        | -      | -    | -    |  |  |
| Platoon blocked, %                                                                                                   | -        | -      | -        | -      | -    | -    |  |  |
| Mov Cap-1 Maneuver                                                                                                   | ~ 49     | 366    | -        | -      | 703  | -    |  |  |
| Mov Cap-2 Maneuver                                                                                                   | ~ 49     | -      | -        | -      | -    | -    |  |  |
| Stage 1                                                                                                              | 425      | -      | -        | -      | -    | -    |  |  |
| Stage 2                                                                                                              | 212      | -      | -        | -      | -    | -    |  |  |
|                                                                                                                      |          |        |          |        |      |      |  |  |
| Approach                                                                                                             | WB       | NB     |          | SB     |      |      |  |  |
| HCM Control Delay, s                                                                                                 | \$ 709.3 | 0      |          | 2      |      |      |  |  |
| HCM LOS                                                                                                              | F        |        |          |        |      |      |  |  |
|                                                                                                                      |          |        |          |        |      |      |  |  |
| Minor Lane/Major Mvmt                                                                                                | NBT      | NBR    | WBLn1    | SBL    | SBT  |      |  |  |
| Capacity (veh/h)                                                                                                     | -        | -      | 123      | 703    | -    |      |  |  |
| HCM Lane V/C Ratio                                                                                                   | -        | -      | 2.396    | 0.223  | -    |      |  |  |
| HCM Control Delay (s)                                                                                                | -        | -      | \$ 709.3 | 11.6   | 0    |      |  |  |
| HCM Lane LOS                                                                                                         | -        | -      | F        | B      | A    |      |  |  |
| HCM 95th %ile Q(veh)                                                                                                 | -        | -      | 25.8     | 0.9    |      |      |  |  |
| Notes                                                                                                                |          |        |          |        |      |      |  |  |
| ~: Volume exceeds capacity    \$: Delay exceeds 300s    +: Computation Not Defined    *: All major volume in platoon |          |        |          |        |      |      |  |  |

12239.00 :: Needham Street  
16: Winchester Street/Centre Street & Route 9 WB Access Road

2018 Existing Conditions  
Timing Plan: Saturday MIDDAY

| Intersection                                                                                                         |        |      |           |           |       |        |      |      |        |      |      |      |
|----------------------------------------------------------------------------------------------------------------------|--------|------|-----------|-----------|-------|--------|------|------|--------|------|------|------|
| Int Delay, s/veh                                                                                                     | 140.5  |      |           |           |       |        |      |      |        |      |      |      |
| Movement                                                                                                             | EBL    | EBT  | EBR       | WBL       | WBT   | WBR    | NBL  | NBT  | NBR    | SBL  | SBT  | SBR  |
| Lane Configurations                                                                                                  |        |      |           |           |       |        |      |      |        |      |      |      |
| Traffic Vol, veh/h                                                                                                   | 1      | 0    | 40        | 145       | 20    | 15     | 180  | 665  | 0      | 0    | 580  | 125  |
| Future Vol, veh/h                                                                                                    | 1      | 0    | 40        | 145       | 20    | 15     | 180  | 665  | 0      | 0    | 580  | 125  |
| Conflicting Peds, #/hr                                                                                               | 0      | 0    | 2         | 2         | 0     | 0      | 13   | 0    | 2      | 2    | 0    | 13   |
| Sign Control                                                                                                         | Stop   | Stop | Stop      | Stop      | Stop  | Stop   | Free | Free | Free   | Free | Free | Free |
| RT Channelized                                                                                                       | -      | -    | None      | -         | -     | None   | -    | -    | None   | -    | -    | Free |
| Storage Length                                                                                                       | -      | -    | -         | -         | -     | 50     | 0    | -    | -      | -    | -    | -    |
| Veh in Median Storage, #                                                                                             | -      | 0    | -         | -         | 0     | -      | -    | 0    | -      | -    | 0    | -    |
| Grade, %                                                                                                             | -      | 0    | -         | -         | 0     | -      | -    | 0    | -      | -    | 0    | -    |
| Peak Hour Factor                                                                                                     | 83     | 83   | 83        | 96        | 96    | 96     | 89   | 89   | 89     | 87   | 87   | 87   |
| Heavy Vehicles, %                                                                                                    | 0      | 0    | 0         | 0         | 0     | 0      | 0    | 0    | 0      | 0    | 0    | 0    |
| Mvmt Flow                                                                                                            | 1      | 0    | 48        | 151       | 21    | 16     | 202  | 747  | 0      | 0    | 667  | 144  |
|                                                                                                                      |        |      |           |           |       |        |      |      |        |      |      |      |
| Major/Minor                                                                                                          | Minor2 |      | Minor1    |           |       | Major1 |      |      | Major2 |      |      |      |
| Conflicting Flow All                                                                                                 | 1842   | 1832 | 682       | 1845      | 1832  | 747    | 680  | 0    | -      | -    | -    | 0    |
| Stage 1                                                                                                              | 680    | 680  | -         | 1152      | 1152  | -      | -    | -    | -      | -    | -    | -    |
| Stage 2                                                                                                              | 1162   | 1152 | -         | 693       | 680   | -      | -    | -    | -      | -    | -    | -    |
| Critical Hdwy                                                                                                        | 7.1    | 6.5  | 6.2       | 7.1       | 6.5   | 6.2    | 4.1  | -    | -      | -    | -    | -    |
| Critical Hdwy Stp 1                                                                                                  | 6.1    | 5.5  | -         | 6.1       | 5.5   | -      | -    | -    | -      | -    | -    | -    |
| Critical Hdwy Stp 2                                                                                                  | 6.1    | 5.5  | -         | 6.1       | 5.5   | -      | -    | -    | -      | -    | -    | -    |
| Follow-up Hdwy                                                                                                       | 3.5    | 4    | 3.3       | 3.5       | 4     | 3.3    | 2.2  | -    | -      | -    | -    | -    |
| Pot Cap-1 Maneuver                                                                                                   | 58     | 77   | 453       | ~58       | 77    | 416    | 922  | -    | 0      | 0    | -    | 0    |
| Stage 1                                                                                                              | 444    | 454  | -         | 243       | 275   | -      | -    | -    | 0      | 0    | -    | 0    |
| Stage 2                                                                                                              | 240    | 275  | -         | 437       | 454   | -      | -    | -    | 0      | 0    | -    | 0    |
| Platoon blocked, %                                                                                                   |        |      |           |           |       |        |      |      |        |      |      |      |
| Mov Cap-1 Maneuver                                                                                                   | 34     | 59   | 447       | ~43       | 59    | 416    | 920  | -    | -      | -    | -    | -    |
| Mov Cap-2 Maneuver                                                                                                   | 34     | 59   | -         | ~43       | 59    | -      | -    | -    | -      | -    | -    | -    |
| Stage 1                                                                                                              | 343    | 449  | -         | 190       | 215   | -      | -    | -    | -      | -    | -    | -    |
| Stage 2                                                                                                              | 163    | 215  | -         | 389       | 449   | -      | -    | -    | -      | -    | -    | -    |
|                                                                                                                      |        |      |           |           |       |        |      |      |        |      |      |      |
| Approach                                                                                                             | EB     |      | WB        |           |       | NB     |      |      | SB     |      |      |      |
| HCM Control Delay, s                                                                                                 | 17.2   |      | \$ 1373.1 |           |       | 2.1    |      |      | 0      |      |      |      |
| HCM LOS                                                                                                              | C      |      | F         |           |       |        |      |      |        |      |      |      |
|                                                                                                                      |        |      |           |           |       |        |      |      |        |      |      |      |
| Minor Lane/Major Mvmt                                                                                                | NBL    | NBT  | EBLn1     | WBLn1     | WBLn2 | SBT    |      |      |        |      |      |      |
| Capacity (veh/h)                                                                                                     | 920    | -    | 345       | 44        | 416   | -      |      |      |        |      |      |      |
| HCM Lane V/C Ratio                                                                                                   | 0.22   | -    | 0.143     | 3.906     | 0.038 | -      |      |      |        |      |      |      |
| HCM Control Delay (s)                                                                                                | 10     | -    | 17.2      | \$ 1496.6 | 14    | -      |      |      |        |      |      |      |
| HCM Lane LOS                                                                                                         | B      | -    | C         | F         | B     | -      |      |      |        |      |      |      |
| HCM 95th %tile Q(veh)                                                                                                | 0.8    | -    | 0.5       | 19.3      | 0.1   | -      |      |      |        |      |      |      |
|                                                                                                                      |        |      |           |           |       |        |      |      |        |      |      |      |
| Notes                                                                                                                |        |      |           |           |       |        |      |      |        |      |      |      |
| ~: Volume exceeds capacity    \$: Delay exceeds 300s    +: Computation Not Defined    *: All major volume in platoon |        |      |           |           |       |        |      |      |        |      |      |      |

12239.00 :: Needham Street  
17: Centre Street & Walnut Street

2018 Existing Conditions  
Timing Plan: Saturday MIDDAY

| Lane Group              | SEL   | SET   | SER   | NWL   | NWT   | NWR   | NEL   | NET   | NER   | SWL   | SWT   | SWR   | Ø3 |
|-------------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|----|
| Lane Configurations     |       |       |       |       |       |       |       |       |       |       |       |       |    |
| Traffic Volume (vph)    | 30    | 10    | 315   | 40    | 90    | 5     | 390   | 280   | 10    | 5     | 350   | 65    |    |
| Future Volume (vph)     | 30    | 10    | 315   | 40    | 90    | 5     | 390   | 280   | 10    | 5     | 350   | 65    |    |
| Ideal Flow (vphpl)      | 1900  | 1900  | 1900  | 1900  | 1900  | 1900  | 1900  | 1900  | 1900  | 1900  | 1900  | 1900  |    |
| Storage Length (ft)     | 0     | 0     | 50    | 0     | 0     | 0     | 75    | 0     | 0     | 0     | 0     | 0     |    |
| Storage Lanes           | 0     | 0     | 1     | 0     | 0     | 0     | 1     | 0     | 0     | 0     | 0     | 0     |    |
| Taper Length (ft)       | 25    | 0     | 0     | 25    | 0     | 0     | 25    | 0     | 0     | 25    | 0     | 0     |    |
| Satd. Flow (prot)       | 0     | 1813  | 1599  | 0     | 1860  | 0     | 1805  | 1889  | 0     | 0     | 1850  | 0     |    |
| Flt Permitted           | 0.595 | 0.595 | 0.595 | 0.884 | 0.348 | 0.348 | 0.996 | 0.996 | 0.996 | 0.996 | 0.996 | 0.996 |    |
| Satd. Flow (perm)       | 0     | 1112  | 1557  | 0     | 1662  | 0     | 660   | 1889  | 0     | 0     | 1845  | 0     |    |
| Right Turn on Red       | No    |       |       |       |       |       |       |       |       |       |       |       |    |
| Satd. Flow (RTOR)       | 3     |       |       |       |       |       |       |       |       |       |       |       |    |
| Link Speed (mph)        | 30    | 30    | 30    | 30    | 30    | 30    | 30    | 30    | 30    | 30    | 30    | 30    |    |
| Link Distance (ft)      | 624   | 387   | 508   | 531   | 531   | 531   | 531   | 531   | 531   | 531   | 531   | 531   |    |
| Travel Time (s)         | 14.2  | 8.8   | 11.5  | 12.1  | 12.1  | 12.1  | 12.1  | 12.1  | 12.1  | 12.1  | 12.1  | 12.1  |    |
| Confl. Peds. (#/hr)     | 4     | 4     | 4     | 4     | 4     | 4     | 4     | 4     | 4     | 4     | 4     | 4     |    |
| Confl. Bikes (#/hr)     | 2     |       |       |       |       |       |       |       |       |       |       |       |    |
| Peak Hour Factor        | 0.94  | 0.94  | 0.94  | 0.94  | 0.94  | 0.94  | 0.86  | 0.86  | 0.86  | 0.83  | 0.83  | 0.83  |    |
| Heavy Vehicles (%)      | 1%    | 1%    | 1%    | 0%    | 0%    | 0%    | 0%    | 0%    | 0%    | 0%    | 0%    | 0%    |    |
| Shared Lane Traffic (%) |       |       |       |       |       |       |       |       |       |       |       |       |    |
| Lane Group Flow (vph)   | 0     | 43    | 335   | 0     | 144   | 0     | 453   | 338   | 0     | 0     | 506   | 0     |    |
| Turn Type               | Perm  | NA    | pm+ov | Perm  | NA    | NA    | NA    | NA    | Perm  | NA    | NA    | NA    |    |
| Protected Phases        | 4     | 1     | 4     | 4     | 4     | 1     | 12    | 2     | 2     | 2     | 2     | 3     |    |
| Permitted Phases        | 4     | 4     | 4     | 4     | 4     | 2     | 2     | 2     | 2     | 2     | 2     | 2     |    |
| Detector Phase          | 4     | 4     | 1     | 4     | 4     | 1     | 12    | 2     | 2     | 2     | 2     | 2     |    |
| Switch Phase            |       |       |       |       |       |       |       |       |       |       |       |       |    |
| Minimum Initial (s)     | 9.0   | 9.0   | 7.0   | 9.0   | 9.0   | 7.0   | 6.0   | 6.0   | 6.0   | 6.0   | 6.0   | 6.0   |    |
| Minimum Split (s)       | 14.0  | 14.0  | 12.0  | 14.0  | 14.0  | 12.0  | 11.0  | 11.0  | 11.0  | 11.0  | 11.0  | 11.0  |    |
| Total Split (s)         | 19.0  | 19.0  | 25.0  | 19.0  | 19.0  | 25.0  | 45.0  | 45.0  | 45.0  | 45.0  | 45.0  | 45.0  |    |
| Total Split (%)         | 17.6% | 17.6% | 23.1% | 17.6% | 17.6% | 23.1% | 41.7% | 41.7% | 41.7% | 41.7% | 41.7% | 41.7% |    |
| Yellow Time (s)         | 4.0   | 4.0   | 4.0   | 4.0   | 4.0   | 4.0   | 4.0   | 4.0   | 4.0   | 4.0   | 4.0   | 4.0   |    |
| All-Red Time (s)        | 1.0   | 1.0   | 1.0   | 1.0   | 1.0   | 1.0   | 1.0   | 1.0   | 1.0   | 1.0   | 1.0   | 1.0   |    |
| Lost Time Adjust (s)    | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   |    |
| Total Lost Time (s)     | 5.0   | 5.0   | 5.0   | 5.0   | 5.0   | 5.0   | 5.0   | 5.0   | 5.0   | 5.0   | 5.0   | 5.0   |    |
| Lead/Lag                | Lag   | Lag   | Lead  | Lag   | Lag   | Lead  | Lag   | Lag   | Lead  | Lag   | Lag   | Lead  |    |
| Lead-Lag Optimize?      |       |       |       |       |       |       |       |       |       |       |       |       |    |
| Recall Mode             | Min   | Min   | Max   | Min   | Min   | Max   | Max   | Max   | Max   | Max   | Max   | Max   |    |
| Act Effct Green (s)     | 11.8  | 32.0  | 11.8  | 11.8  | 11.8  | 65.8  | 65.8  | 65.8  | 65.8  | 65.8  | 65.8  | 65.8  |    |
| Actuated g/C Ratio      | 0.12  | 0.34  | 0.12  | 0.12  | 0.12  | 0.64  | 0.70  | 0.70  | 0.70  | 0.70  | 0.70  | 0.70  |    |
| v/c Ratio               | 0.31  | 0.62  | 0.70  | 0.68  | 0.68  | 0.26  | 0.63  | 0.63  | 0.63  | 0.63  | 0.63  | 0.63  |    |
| Control Delay           | 46.8  | 31.2  | 59.7  | 14.5  | 7.6   | 27.4  | 27.4  | 27.4  | 27.4  | 27.4  | 27.4  | 27.4  |    |
| Queue Delay             | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   |    |
| Total Delay             | 46.8  | 31.2  | 59.7  | 14.5  | 7.6   | 27.4  | 27.4  | 27.4  | 27.4  | 27.4  | 27.4  | 27.4  |    |
| LOS                     | D     | C     | E     | B     | A     | C     | C     | C     | C     | C     | C     | C     |    |
| Approach Delay          | 32.9  | 59.7  | 11.6  | 11.6  | 11.6  | 27.4  | 27.4  | 27.4  | 27.4  | 27.4  | 27.4  | 27.4  |    |
| Approach LOS            | C     | E     | B     | B     | B     | C     | C     | C     | C     | C     | C     | C     |    |
| Queue Length 50th (ft)  | 21    | 130   | 76    | 68    | 45    | 195   | 195   | 195   | 195   | 195   | 195   | 195   |    |
| Queue Length 95th (ft)  | 63    | 281   | #180  | 210   | 147   | 374   | 374   | 374   | 374   | 374   | 374   | 374   |    |
| Internal Link Dist (ft) | 544   | 307   | 428   | 451   | 451   | 451   | 451   | 451   | 451   | 451   | 451   | 451   |    |
| Turn Bay Length (ft)    | 50    |       |       |       |       |       |       |       |       |       |       |       |    |
| Base Capacity (vph)     | 167   | 537   | 249   | 670   | 1318  | 797   | 797   | 797   | 797   | 797   | 797   | 797   |    |
| Starvation Cap Reductn  | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     |    |
| Spillback Cap Reductn   | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     |    |
| Storage Cap Reductn     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     |    |
| Reduced v/c Ratio       | 0.26  | 0.62  | 0.58  | 0.68  | 0.26  | 0.63  | 0.63  | 0.63  | 0.63  | 0.63  | 0.63  | 0.63  |    |

| Intersection Summary                                            |                  |  |  |  |  |  |  |  |  |  |  |  |
|-----------------------------------------------------------------|------------------|--|--|--|--|--|--|--|--|--|--|--|
| Area Type:                                                      | Other            |  |  |  |  |  |  |  |  |  |  |  |
| Cycle Length:                                                   | 108              |  |  |  |  |  |  |  |  |  |  |  |
| Actuated Cycle Length:                                          | 94.4             |  |  |  |  |  |  |  |  |  |  |  |
| Natural Cycle:                                                  | 90               |  |  |  |  |  |  |  |  |  |  |  |
| Control Type:                                                   | Semi Act-Uncoord |  |  |  |  |  |  |  |  |  |  |  |
| Maximum v/c Ratio:                                              | 0.70             |  |  |  |  |  |  |  |  |  |  |  |
| Intersection Signal Delay:                                      | 24.2             |  |  |  |  |  |  |  |  |  |  |  |
| Intersection Capacity Utilization:                              | 70.8%            |  |  |  |  |  |  |  |  |  |  |  |
| Analysis Period (min):                                          | 15               |  |  |  |  |  |  |  |  |  |  |  |
| # 95th percentile volume exceeds capacity, queue may be longer. |                  |  |  |  |  |  |  |  |  |  |  |  |
| Queue shown is maximum after two cycles.                        |                  |  |  |  |  |  |  |  |  |  |  |  |





12239.00 :: Needham Street  
18: Nahanton Street & Winchester Street

2018 Existing Conditions  
Timing Plan: Saturday MIDDAY

| Lane Group              | EBL                                                                               | EBT                                                                               | WBT                                                                               | WBR                                                                               | SBL                                                                               | SBR                                                                               |
|-------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|
| Lane Configurations     |  |  |  |  |  |  |
| Traffic Volume (vph)    | 250                                                                               | 430                                                                               | 460                                                                               | 45                                                                                | 65                                                                                | 275                                                                               |
| Future Volume (vph)     | 250                                                                               | 430                                                                               | 460                                                                               | 45                                                                                | 65                                                                                | 275                                                                               |
| Ideal Flow (vphpl)      | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                              |
| Storage Length (ft)     | 175                                                                               |                                                                                   |                                                                                   |                                                                                   | 0                                                                                 | 75                                                                                |
| Storage Lanes           | 1                                                                                 |                                                                                   |                                                                                   |                                                                                   | 0                                                                                 | 1                                                                                 |
| Taper Length (ft)       | 25                                                                                |                                                                                   |                                                                                   |                                                                                   | 25                                                                                |                                                                                   |
| Satd. Flow (prot)       | 1805                                                                              | 1900                                                                              | 1872                                                                              | 0                                                                                 | 1805                                                                              | 1615                                                                              |
| Flt Permitted           | 0.298                                                                             |                                                                                   |                                                                                   |                                                                                   | 0.950                                                                             |                                                                                   |
| Satd. Flow (perm)       | 566                                                                               | 1900                                                                              | 1872                                                                              | 0                                                                                 | 1805                                                                              | 1615                                                                              |
| Right Turn on Red       |                                                                                   |                                                                                   |                                                                                   | Yes                                                                               |                                                                                   | No                                                                                |
| Satd. Flow (RTOR)       |                                                                                   |                                                                                   | 8                                                                                 |                                                                                   |                                                                                   |                                                                                   |
| Link Speed (mph)        |                                                                                   | 30                                                                                | 30                                                                                |                                                                                   | 30                                                                                |                                                                                   |
| Link Distance (ft)      |                                                                                   | 963                                                                               | 734                                                                               |                                                                                   | 889                                                                               |                                                                                   |
| Travel Time (s)         |                                                                                   | 21.9                                                                              | 16.7                                                                              |                                                                                   | 20.2                                                                              |                                                                                   |
| Confl. Peds. (#/hr)     | 1                                                                                 |                                                                                   |                                                                                   | 1                                                                                 |                                                                                   |                                                                                   |
| Confl. Bikes (#/hr)     |                                                                                   |                                                                                   |                                                                                   | 13                                                                                |                                                                                   |                                                                                   |
| Peak Hour Factor        | 0.98                                                                              | 0.98                                                                              | 0.92                                                                              | 0.92                                                                              | 0.85                                                                              | 0.85                                                                              |
| Heavy Vehicles (%)      | 0%                                                                                | 0%                                                                                | 0%                                                                                | 0%                                                                                | 0%                                                                                | 0%                                                                                |
| Shared Lane Traffic (%) |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| Lane Group Flow (vph)   | 255                                                                               | 439                                                                               | 549                                                                               | 0                                                                                 | 76                                                                                | 324                                                                               |
| Turn Type               | pm+pt                                                                             | NA                                                                                | NA                                                                                |                                                                                   | Prot                                                                              | pt+ov                                                                             |
| Protected Phases        | 5                                                                                 | 2                                                                                 | 6                                                                                 |                                                                                   | 8                                                                                 | 5 8                                                                               |
| Permitted Phases        | 2                                                                                 |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| Detector Phase          | 5                                                                                 | 2                                                                                 | 6                                                                                 |                                                                                   | 8                                                                                 | 5 8                                                                               |
| Switch Phase            |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| Minimum Initial (s)     | 6.0                                                                               | 10.0                                                                              | 10.0                                                                              |                                                                                   | 6.0                                                                               |                                                                                   |
| Minimum Split (s)       | 11.0                                                                              | 15.0                                                                              | 23.0                                                                              |                                                                                   | 10.0                                                                              |                                                                                   |
| Total Split (s)         | 17.0                                                                              | 67.0                                                                              | 50.0                                                                              |                                                                                   | 21.0                                                                              |                                                                                   |
| Total Split (%)         | 19.3%                                                                             | 76.1%                                                                             | 56.8%                                                                             |                                                                                   | 23.9%                                                                             |                                                                                   |
| Yellow Time (s)         | 3.0                                                                               | 3.0                                                                               | 3.0                                                                               |                                                                                   | 3.0                                                                               |                                                                                   |
| All-Red Time (s)        | 2.0                                                                               | 2.0                                                                               | 2.0                                                                               |                                                                                   | 1.0                                                                               |                                                                                   |
| Lost Time Adjust (s)    | 0.0                                                                               | 0.0                                                                               | 0.0                                                                               |                                                                                   | 0.0                                                                               |                                                                                   |
| Total Lost Time (s)     | 5.0                                                                               | 5.0                                                                               | 5.0                                                                               |                                                                                   | 4.0                                                                               |                                                                                   |
| Lead/Lag                | Lead                                                                              |                                                                                   | Lag                                                                               |                                                                                   |                                                                                   |                                                                                   |
| Lead-Lag Optimize?      | Yes                                                                               |                                                                                   | Yes                                                                               |                                                                                   |                                                                                   |                                                                                   |
| Recall Mode             | None                                                                              | C-Min                                                                             | None                                                                              |                                                                                   | None                                                                              |                                                                                   |
| Act Effct Green (s)     | 61.5                                                                              | 61.5                                                                              | 46.6                                                                              |                                                                                   | 17.5                                                                              | 31.4                                                                              |
| Actuated g/C Ratio      | 0.70                                                                              | 0.70                                                                              | 0.53                                                                              |                                                                                   | 0.20                                                                              | 0.36                                                                              |
| v/c Ratio               | 0.48                                                                              | 0.33                                                                              | 0.55                                                                              |                                                                                   | 0.21                                                                              | 0.56                                                                              |
| Control Delay           | 8.2                                                                               | 6.4                                                                               | 17.3                                                                              |                                                                                   | 29.9                                                                              | 26.2                                                                              |
| Queue Delay             | 0.0                                                                               | 0.0                                                                               | 0.0                                                                               |                                                                                   | 0.0                                                                               | 0.0                                                                               |
| Total Delay             | 8.2                                                                               | 6.4                                                                               | 17.3                                                                              |                                                                                   | 29.9                                                                              | 26.2                                                                              |
| LOS                     | A                                                                                 | A                                                                                 | B                                                                                 |                                                                                   | C                                                                                 | C                                                                                 |
| Approach Delay          |                                                                                   | 7.1                                                                               | 17.3                                                                              |                                                                                   | 26.9                                                                              |                                                                                   |
| Approach LOS            |                                                                                   | A                                                                                 | B                                                                                 |                                                                                   | C                                                                                 |                                                                                   |
| Queue Length 50th (ft)  | 43                                                                                | 83                                                                                | 190                                                                               |                                                                                   | 35                                                                                | 141                                                                               |
| Queue Length 95th (ft)  | 77                                                                                | 137                                                                               | 316                                                                               |                                                                                   | 67                                                                                | 192                                                                               |
| Internal Link Dist (ft) |                                                                                   | 883                                                                               | 654                                                                               |                                                                                   | 809                                                                               |                                                                                   |
| Turn Bay Length (ft)    | 175                                                                               |                                                                                   |                                                                                   |                                                                                   | 75                                                                                |                                                                                   |
| Base Capacity (vph)     | 564                                                                               | 1360                                                                              | 1022                                                                              |                                                                                   | 380                                                                               | 597                                                                               |
| Starvation Cap Reductn  | 0                                                                                 | 0                                                                                 | 0                                                                                 |                                                                                   | 0                                                                                 | 0                                                                                 |
| Spillback Cap Reductn   | 0                                                                                 | 0                                                                                 | 0                                                                                 |                                                                                   | 0                                                                                 | 0                                                                                 |
| Storage Cap Reductn     | 0                                                                                 | 0                                                                                 | 0                                                                                 |                                                                                   | 0                                                                                 | 0                                                                                 |
| Reduced v/c Ratio       | 0.45                                                                              | 0.32                                                                              | 0.54                                                                              |                                                                                   | 0.20                                                                              | 0.54                                                                              |

| Intersection Summary               |                                                    |
|------------------------------------|----------------------------------------------------|
| Area Type:                         | Other                                              |
| Cycle Length:                      | 88                                                 |
| Actuated Cycle Length:             | 88                                                 |
| Offset:                            | 8 (9%), Referenced to phase 2:EBTL, Start of Green |
| Natural Cycle:                     | 50                                                 |
| Control Type:                      | Actuated-Coordinated                               |
| Maximum v/c Ratio:                 | 0.56                                               |
| Intersection Signal Delay:         | 15.3                                               |
| Intersection Capacity Utilization: | 57.5%                                              |
| Analysis Period (min):             | 15                                                 |
| ICU Level of Service:              | B                                                  |

Splits and Phases: 18: Nahanton Street & Winchester Street



12239.00 :: Needham Street  
19: Wells Avenue/JCC Driveway & Nahanton Street

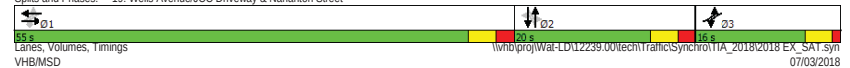
2018 Existing Conditions  
Timing Plan: Saturday MIDDAY

| Lane Group              | EBL                                                                                 | EBT                                                                                 | EBR                                                                                 | WBL                                                                                 | WBT                                                                                 | WBR                                                                                 | NBL                                                                                 | NBT                                                                                 | NBR                                                                                 | SBL                                                                                 | SBT                                                                                 | SBR                                                                                 |
|-------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
| Lane Configurations     |  |  |  |  |  |  |  |  |  |  |  |  |
| Traffic Volume (vph)    | 20                                                                                  | 515                                                                                 | 120                                                                                 | 165                                                                                 | 540                                                                                 | 30                                                                                  | 195                                                                                 | 5                                                                                   | 125                                                                                 | 40                                                                                  | 2                                                                                   | 35                                                                                  |
| Future Volume (vph)     | 20                                                                                  | 515                                                                                 | 120                                                                                 | 165                                                                                 | 540                                                                                 | 30                                                                                  | 195                                                                                 | 5                                                                                   | 125                                                                                 | 40                                                                                  | 2                                                                                   | 35                                                                                  |
| Ideal Flow (vphpl)      | 1900                                                                                | 1900                                                                                | 1900                                                                                | 1900                                                                                | 1900                                                                                | 1900                                                                                | 1900                                                                                | 1900                                                                                | 1900                                                                                | 1900                                                                                | 1900                                                                                | 1900                                                                                |
| Storage Length (ft)     | 125                                                                                 |                                                                                     | 125                                                                                 | 150                                                                                 |                                                                                     | 0                                                                                   | 0                                                                                   | 0                                                                                   | 0                                                                                   | 75                                                                                  |                                                                                     | 0                                                                                   |
| Storage Lanes           | 1                                                                                   |                                                                                     | 1                                                                                   |                                                                                     |                                                                                     | 0                                                                                   | 1                                                                                   |                                                                                     | 0                                                                                   | 1                                                                                   |                                                                                     | 0                                                                                   |
| Taper Length (ft)       | 25                                                                                  |                                                                                     | 25                                                                                  |                                                                                     |                                                                                     | 25                                                                                  |                                                                                     |                                                                                     | 25                                                                                  |                                                                                     |                                                                                     | 25                                                                                  |
| Satd. Flow (prot)       | 1805                                                                                | 1900                                                                                | 1615                                                                                | 1805                                                                                | 1882                                                                                | 0                                                                                   | 1805                                                                                | 1626                                                                                | 0                                                                                   | 1805                                                                                | 1630                                                                                | 0                                                                                   |
| Flt Permitted           | 0.265                                                                               |                                                                                     | 0.300                                                                               |                                                                                     |                                                                                     | 0.732                                                                               |                                                                                     | 0.657                                                                               |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Satd. Flow (perm)       | 504                                                                                 | 1900                                                                                | 1570                                                                                | 570                                                                                 | 1882                                                                                | 0                                                                                   | 1391                                                                                | 1626                                                                                | 0                                                                                   | 1248                                                                                | 1630                                                                                | 0                                                                                   |
| Right Turn on Red       |                                                                                     | Yes                                                                                 |                                                                                     |                                                                                     | Yes                                                                                 |                                                                                     |                                                                                     | Yes                                                                                 |                                                                                     |                                                                                     | Yes                                                                                 |                                                                                     |
| Satd. Flow (RTOR)       |                                                                                     | 122                                                                                 |                                                                                     |                                                                                     | 5                                                                                   |                                                                                     |                                                                                     | 151                                                                                 |                                                                                     |                                                                                     | 36                                                                                  |                                                                                     |
| Link Speed (mph)        |                                                                                     | 30                                                                                  |                                                                                     |                                                                                     | 30                                                                                  |                                                                                     |                                                                                     | 30                                                                                  |                                                                                     |                                                                                     | 30                                                                                  |                                                                                     |
| Link Distance (ft)      |                                                                                     | 797                                                                                 |                                                                                     |                                                                                     | 963                                                                                 |                                                                                     |                                                                                     | 598                                                                                 |                                                                                     |                                                                                     | 628                                                                                 |                                                                                     |
| Travel Time (s)         |                                                                                     | 18.1                                                                                |                                                                                     |                                                                                     | 21.9                                                                                |                                                                                     |                                                                                     | 13.6                                                                                |                                                                                     |                                                                                     | 14.3                                                                                |                                                                                     |
| Confl. Peds. (#/hr)     |                                                                                     |                                                                                     | 1                                                                                   | 1                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Confl. Bikes (#/hr)     |                                                                                     |                                                                                     | 10                                                                                  |                                                                                     |                                                                                     |                                                                                     | 12                                                                                  |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Peak Hour Factor        | 0.95                                                                                | 0.95                                                                                | 0.85                                                                                | 0.98                                                                                | 0.98                                                                                | 0.98                                                                                | 0.83                                                                                | 0.83                                                                                | 0.83                                                                                | 0.98                                                                                | 0.98                                                                                | 0.98                                                                                |
| Heavy Vehicles (%)      | 0%                                                                                  | 0%                                                                                  | 0%                                                                                  | 0%                                                                                  | 0%                                                                                  | 0%                                                                                  | 0%                                                                                  | 0%                                                                                  | 0%                                                                                  | 0%                                                                                  | 0%                                                                                  | 0%                                                                                  |
| Shared Lane Traffic (%) |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Lane Group Flow (vph)   | 21                                                                                  | 542                                                                                 | 126                                                                                 | 168                                                                                 | 582                                                                                 | 0                                                                                   | 235                                                                                 | 157                                                                                 | 0                                                                                   | 41                                                                                  | 38                                                                                  | 0                                                                                   |
| Turn Type               | pm+pt                                                                               | NA                                                                                  | Perm                                                                                | pm+pt                                                                               | NA                                                                                  |                                                                                     | Perm                                                                                | NA                                                                                  |                                                                                     | Perm                                                                                | NA                                                                                  |                                                                                     |
| Protected Phases        | 3                                                                                   | 1                                                                                   |                                                                                     | 3                                                                                   | 1                                                                                   |                                                                                     |                                                                                     | 2                                                                                   |                                                                                     |                                                                                     | 2                                                                                   |                                                                                     |
| Permitted Phases        | 1                                                                                   |                                                                                     | 1                                                                                   | 1                                                                                   |                                                                                     |                                                                                     | 2                                                                                   |                                                                                     |                                                                                     | 2                                                                                   |                                                                                     |                                                                                     |
| Detector Phase          | 3                                                                                   | 1                                                                                   | 1                                                                                   | 3                                                                                   | 1                                                                                   |                                                                                     | 2                                                                                   | 2                                                                                   |                                                                                     | 2                                                                                   | 2                                                                                   |                                                                                     |
| Switch Phase            |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Minimum Initial (s)     | 6.0                                                                                 | 6.0                                                                                 | 6.0                                                                                 | 6.0                                                                                 | 6.0                                                                                 |                                                                                     | 6.0                                                                                 | 6.0                                                                                 |                                                                                     | 6.0                                                                                 | 6.0                                                                                 |                                                                                     |
| Minimum Split (s)       | 10.0                                                                                | 11.0                                                                                | 11.0                                                                                | 10.0                                                                                | 11.0                                                                                |                                                                                     | 11.0                                                                                | 11.0                                                                                |                                                                                     | 11.0                                                                                | 11.0                                                                                |                                                                                     |
| Total Split (s)         | 16.0                                                                                | 55.0                                                                                | 55.0                                                                                | 16.0                                                                                | 55.0                                                                                |                                                                                     | 20.0                                                                                | 20.0                                                                                |                                                                                     | 20.0                                                                                | 20.0                                                                                |                                                                                     |
| Total Split (%)         | 17.6%                                                                               | 60.4%                                                                               | 60.4%                                                                               | 17.6%                                                                               | 60.4%                                                                               |                                                                                     | 22.0%                                                                               | 22.0%                                                                               |                                                                                     | 22.0%                                                                               | 22.0%                                                                               |                                                                                     |
| Yellow Time (s)         | 3.0                                                                                 | 3.0                                                                                 | 3.0                                                                                 | 3.0                                                                                 | 3.0                                                                                 |                                                                                     | 3.0                                                                                 | 3.0                                                                                 |                                                                                     | 3.0                                                                                 | 3.0                                                                                 |                                                                                     |
| All-Red Time (s)        | 1.0                                                                                 | 2.0                                                                                 | 2.0                                                                                 | 1.0                                                                                 | 2.0                                                                                 |                                                                                     | 2.0                                                                                 | 2.0                                                                                 |                                                                                     | 2.0                                                                                 | 2.0                                                                                 |                                                                                     |
| Lost Time Adjust (s)    | 0.0                                                                                 | 0.0                                                                                 | 0.0                                                                                 | 0.0                                                                                 | 0.0                                                                                 |                                                                                     | 0.0                                                                                 | 0.0                                                                                 |                                                                                     | 0.0                                                                                 | 0.0                                                                                 |                                                                                     |
| Total Lost Time (s)     | 4.0                                                                                 | 5.0                                                                                 | 5.0                                                                                 | 4.0                                                                                 | 5.0                                                                                 |                                                                                     | 5.0                                                                                 | 5.0                                                                                 |                                                                                     | 5.0                                                                                 | 5.0                                                                                 |                                                                                     |
| Lead/Lag                |                                                                                     | Lead                                                                                | Lead                                                                                |                                                                                     | Lead                                                                                |                                                                                     | Lag                                                                                 | Lag                                                                                 |                                                                                     | Lag                                                                                 | Lag                                                                                 |                                                                                     |
| Lead-Lag Optimize?      |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Recall Mode             | None                                                                                | None                                                                                | None                                                                                | None                                                                                | None                                                                                |                                                                                     | None                                                                                | None                                                                                |                                                                                     | None                                                                                | None                                                                                |                                                                                     |
| Act Effct Green (s)     | 39.0                                                                                | 30.9                                                                                | 30.9                                                                                | 39.0                                                                                | 30.9                                                                                |                                                                                     | 15.5                                                                                | 15.5                                                                                |                                                                                     | 15.5                                                                                | 15.5                                                                                |                                                                                     |
| Actuated g/C Ratio      | 0.57                                                                                | 0.46                                                                                | 0.46                                                                                | 0.57                                                                                | 0.46                                                                                |                                                                                     | 0.23                                                                                | 0.23                                                                                |                                                                                     | 0.23                                                                                | 0.23                                                                                |                                                                                     |
| v/c Ratio               | 0.05                                                                                | 0.63                                                                                | 0.16                                                                                | 0.37                                                                                | 0.68                                                                                |                                                                                     | 0.74                                                                                | 0.32                                                                                |                                                                                     | 0.14                                                                                | 0.10                                                                                |                                                                                     |
| Control Delay           | 4.1                                                                                 | 17.0                                                                                | 2.6                                                                                 | 6.9                                                                                 | 18.2                                                                                |                                                                                     | 45.1                                                                                | 8.3                                                                                 |                                                                                     | 27.8                                                                                | 11.8                                                                                |                                                                                     |
| Queue Delay             | 0.0                                                                                 | 0.0                                                                                 | 0.0                                                                                 | 0.0                                                                                 | 0.0                                                                                 |                                                                                     | 0.0                                                                                 | 0.0                                                                                 |                                                                                     | 0.0                                                                                 | 0.0                                                                                 |                                                                                     |
| Total Delay             | 4.1                                                                                 | 17.0                                                                                | 2.6                                                                                 | 6.9                                                                                 | 18.2                                                                                |                                                                                     | 45.1                                                                                | 8.3                                                                                 |                                                                                     | 27.8                                                                                | 11.8                                                                                |                                                                                     |
| LOS                     | A                                                                                   | B                                                                                   | A                                                                                   | A                                                                                   | B                                                                                   |                                                                                     | D                                                                                   | A                                                                                   |                                                                                     | C                                                                                   | B                                                                                   |                                                                                     |
| Approach Delay          |                                                                                     | 13.9                                                                                |                                                                                     |                                                                                     | 15.6                                                                                |                                                                                     |                                                                                     | 30.4                                                                                |                                                                                     |                                                                                     | 20.1                                                                                |                                                                                     |
| Approach LOS            |                                                                                     | B                                                                                   |                                                                                     |                                                                                     | B                                                                                   |                                                                                     |                                                                                     | C                                                                                   |                                                                                     |                                                                                     | C                                                                                   |                                                                                     |
| Queue Length 50th (ft)  | 3                                                                                   | 158                                                                                 | 1                                                                                   | 23                                                                                  | 173                                                                                 |                                                                                     | 88                                                                                  | 2                                                                                   |                                                                                     | 13                                                                                  | 1                                                                                   |                                                                                     |
| Queue Length 95th (ft)  | 8                                                                                   | 249                                                                                 | 23                                                                                  | 41                                                                                  | 274                                                                                 |                                                                                     | #246                                                                                | 44                                                                                  |                                                                                     | 49                                                                                  | 27                                                                                  |                                                                                     |
| Internal Link Dist (ft) |                                                                                     | 717                                                                                 |                                                                                     |                                                                                     | 883                                                                                 |                                                                                     |                                                                                     | 518                                                                                 |                                                                                     |                                                                                     | 548                                                                                 |                                                                                     |
| Turn Bay Length (ft)    | 125                                                                                 |                                                                                     | 125                                                                                 | 150                                                                                 |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     | 75                                                                                  |                                                                                     |                                                                                     |
| Base Capacity (vph)     | 556                                                                                 | 1442                                                                                | 1221                                                                                | 586                                                                                 | 1430                                                                                |                                                                                     | 316                                                                                 | 487                                                                                 |                                                                                     | 284                                                                                 | 399                                                                                 |                                                                                     |
| Starvation Cap Reductn  | 0                                                                                   | 0                                                                                   | 0                                                                                   | 0                                                                                   | 0                                                                                   |                                                                                     | 0                                                                                   | 0                                                                                   |                                                                                     | 0                                                                                   | 0                                                                                   |                                                                                     |
| Spillback Cap Reductn   | 0                                                                                   | 0                                                                                   | 0                                                                                   | 0                                                                                   | 0                                                                                   |                                                                                     | 0                                                                                   | 0                                                                                   |                                                                                     | 0                                                                                   | 0                                                                                   |                                                                                     |
| Storage Cap Reductn     | 0                                                                                   | 0                                                                                   | 0                                                                                   | 0                                                                                   | 0                                                                                   |                                                                                     | 0                                                                                   | 0                                                                                   |                                                                                     | 0                                                                                   | 0                                                                                   |                                                                                     |
| Reduced v/c Ratio       | 0.04                                                                                | 0.38                                                                                | 0.10                                                                                | 0.29                                                                                | 0.41                                                                                |                                                                                     | 0.74                                                                                | 0.32                                                                                |                                                                                     | 0.14                                                                                | 0.10                                                                                |                                                                                     |

| Intersection Summary               |                        |
|------------------------------------|------------------------|
| Area Type:                         | Other                  |
| Cycle Length:                      | 91                     |
| Actuated Cycle Length:             | 67.9                   |
| Natural Cycle:                     | 60                     |
| Control Type:                      | Actuated-Uncoordinated |
| Maximum v/c Ratio:                 | 0.74                   |
| Intersection Signal Delay:         | 18.2                   |
| Intersection Capacity Utilization: | 67.9%                  |
| Analysis Period (min):             | 15                     |
| ICU Level of Service:              | C                      |

# 95th percentile volume exceeds capacity, queue may be longer.  
Queue shown is maximum after two cycles.

Splits and Phases: 19: Wells Avenue/JCC Driveway & Nahanton Street



07/03/2018

12239.00 :: Needham Street  
20: Highland Avenue & Riverside Street

2018 Existing Conditions  
Timing Plan: Saturday Midday

| Intersection             |        |        |       |        |      |      |
|--------------------------|--------|--------|-------|--------|------|------|
| Int Delay, s/veh         | 0.4    |        |       |        |      |      |
| Movement                 | NWL    | NWR    | NET   | NER    | SWL  | SWT  |
| Lane Configurations      | ↔      |        | ↔     |        |      | ↔    |
| Traffic Vol, veh/h       | 5      | 10     | 720   | 2      | 5    | 885  |
| Future Vol, veh/h        | 5      | 10     | 720   | 2      | 5    | 885  |
| Conflicting Peds, #/hr   | 0      | 0      | 0     | 5      | 5    | 0    |
| Sign Control             | Stop   | Stop   | Free  | Free   | Free | Free |
| RT Channelized           | -      | None   | -     | None   | -    | None |
| Storage Length           | 0      | -      | -     | -      | -    | -    |
| Veh in Median Storage, # | 0      | -      | 0     | -      | -    | 0    |
| Grade, %                 | 0      | -      | 0     | -      | -    | 0    |
| Peak Hour Factor         | 70     | 70     | 97    | 97     | 95   | 95   |
| Heavy Vehicles, %        | 0      | 0      | 0     | 0      | 0    | 0    |
| Mvmt Flow                | 7      | 14     | 742   | 2      | 5    | 932  |
| Major/Minor              |        |        |       |        |      |      |
|                          | Minor1 | Major1 |       | Major2 |      |      |
| Conflicting Flow All     | 1690   | 748    | 0     | 0      | 749  | 0    |
| Stage 1                  | 748    | -      | -     | -      | -    | -    |
| Stage 2                  | 942    | -      | -     | -      | -    | -    |
| Critical Hdwy            | 6.4    | 6.2    | -     | -      | 4.1  | -    |
| Critical Hdwy Stg 1      | 5.4    | -      | -     | -      | -    | -    |
| Critical Hdwy Stg 2      | 5.4    | -      | -     | -      | -    | -    |
| Follow-up Hdwy           | 3.5    | 3.3    | -     | -      | 2.2  | -    |
| Pot Cap-1 Maneuver       | 104    | 416    | -     | -      | 869  | -    |
| Stage 1                  | 471    | -      | -     | -      | -    | -    |
| Stage 2                  | 382    | -      | -     | -      | -    | -    |
| Platoon blocked, %       | -      | -      | -     | -      | -    | -    |
| Mov Cap-1 Maneuver       | 102    | 414    | -     | -      | 869  | -    |
| Mov Cap-2 Maneuver       | 102    | -      | -     | -      | -    | -    |
| Stage 1                  | 469    | -      | -     | -      | -    | -    |
| Stage 2                  | 377    | -      | -     | -      | -    | -    |
| Approach                 |        |        |       |        |      |      |
|                          | NW     | NE     |       | SW     |      |      |
| HCM Control Delay, s     | 24.6   | 0      |       | 0.1    |      |      |
| HCM LOS                  | C      |        |       |        |      |      |
| Minor Lane/Major Mvmt    |        |        |       |        |      |      |
|                          | NET    | NER    | NWLn1 | SWL    | SWT  |      |
| Capacity (veh/h)         | -      | -      | 205   | 869    | -    | -    |
| HCM Lane V/C Ratio       | -      | -      | 0.105 | 0.006  | -    | -    |
| HCM Control Delay (s)    | -      | -      | 24.6  | 9.2    | 0    | -    |
| HCM Lane LOS             | -      | -      | C     | A      | A    | -    |
| HCM 95th %tile Q(veh)    | -      | -      | 0.3   | 0      | -    | -    |

12239.00 :: Needham Street  
21: Highland Avenue & Highland Terrace/Highland Circle

2018 Existing Conditions  
Timing Plan: Saturday Midday

| Intersection             |        |      |        |       |        |       |        |      |      |      |      |      |
|--------------------------|--------|------|--------|-------|--------|-------|--------|------|------|------|------|------|
| Int Delay, s/veh         | 1      |      |        |       |        |       |        |      |      |      |      |      |
| Movement                 | SEL    | SET  | SER    | NWL   | NWT    | NWR   | NEL    | NET  | NER  | SWL  | SWT  | SWR  |
| Lane Configurations      |        | ↔    |        |       | ↔      |       |        | ↔    |      |      | ↔    |      |
| Traffic Vol, veh/h       | 5      | 0    | 10     | 10    | 0      | 5     | 10     | 710  | 10   | 2    | 885  | 2    |
| Future Vol, veh/h        | 5      | 0    | 10     | 10    | 0      | 5     | 10     | 710  | 10   | 2    | 885  | 2    |
| Conflicting Peds, #/hr   | 0      | 0    | 0      | 0     | 0      | 0     | 1      | 0    | 6    | 6    | 0    | 1    |
| Sign Control             | Stop   | Stop | Stop   | Stop  | Stop   | Stop  | Free   | Free | Free | Free | Free | Free |
| RT Channelized           | -      | -    | None   | -     | -      | None  | -      | -    | None | -    | -    | None |
| Storage Length           | -      | -    | -      | -     | -      | -     | -      | -    | -    | -    | -    | -    |
| Veh in Median Storage, # | -      | 0    | -      | -     | 0      | -     | -      | 0    | -    | -    | 0    | -    |
| Grade, %                 | -      | 0    | -      | -     | 0      | -     | -      | 0    | -    | -    | 0    | -    |
| Peak Hour Factor         | 75     | 75   | 75     | 80    | 80     | 80    | 97     | 97   | 97   | 95   | 95   | 95   |
| Heavy Vehicles, %        | 0      | 0    | 0      | 0     | 0      | 0     | 1      | 1    | 1    | 0    | 0    | 0    |
| Mvmt Flow                | 7      | 0    | 13     | 13    | 0      | 6     | 10     | 732  | 10   | 2    | 932  | 2    |
| Major/Minor              |        |      |        |       |        |       |        |      |      |      |      |      |
|                          | Minor2 |      | Minor1 |       | Major1 |       | Major2 |      |      |      |      |      |
| Conflicting Flow All     | 1699   | 1707 | 934    | 1708  | 1703   | 743   | 935    | 0    | 0    | 748  | 0    | 0    |
| Stage 1                  | 938    | 938  | -      | 764   | 764    | -     | -      | -    | -    | -    | -    | -    |
| Stage 2                  | 761    | 769  | -      | 944   | 939    | -     | -      | -    | -    | -    | -    | -    |
| Critical Hdwy            | 7.1    | 6.5  | 6.2    | 7.1   | 6.5    | 6.2   | 4.11   | -    | -    | 4.1  | -    | -    |
| Critical Hdwy Stg 1      | 6.1    | 5.5  | -      | 6.1   | 5.5    | -     | -      | -    | -    | -    | -    | -    |
| Critical Hdwy Stg 2      | 6.1    | 5.5  | -      | 6.1   | 5.5    | -     | -      | -    | -    | -    | -    | -    |
| Follow-up Hdwy           | 3.5    | 4    | 3.3    | 3.5   | 4      | 3.3   | 2.209  | -    | -    | 2.2  | -    | -    |
| Pot Cap-1 Maneuver       | 74     | 92   | 325    | 73    | 93     | 418   | 736    | -    | -    | 870  | -    | -    |
| Stage 1                  | 320    | 346  | -      | 399   | 416    | -     | -      | -    | -    | -    | -    | -    |
| Stage 2                  | 401    | 413  | -      | 317   | 345    | -     | -      | -    | -    | -    | -    | -    |
| Platoon blocked, %       | -      | -    | -      | -     | -      | -     | -      | -    | -    | -    | -    | -    |
| Mov Cap-1 Maneuver       | 71     | 89   | 325    | 68    | 90     | 416   | 736    | -    | -    | 870  | -    | -    |
| Mov Cap-2 Maneuver       | 71     | 89   | -      | 68    | 90     | -     | -      | -    | -    | -    | -    | -    |
| Stage 1                  | 312    | 344  | -      | 388   | 404    | -     | -      | -    | -    | -    | -    | -    |
| Stage 2                  | 386    | 401  | -      | 302   | 343    | -     | -      | -    | -    | -    | -    | -    |
| Approach                 |        |      |        |       |        |       |        |      |      |      |      |      |
|                          | SE     |      | NW     |       | NE     |       | SW     |      |      |      |      |      |
| HCM Control Delay, s     | 33.1   |      | 52.6   |       | 0.1    |       | 0      |      |      |      |      |      |
| HCM LOS                  | D      |      | F      |       |        |       |        |      |      |      |      |      |
| Minor Lane/Major Mvmt    |        |      |        |       |        |       |        |      |      |      |      |      |
|                          | NEL    | NET  | NER    | NWLn1 | SELn1  | SWL   | SWT    | SWR  |      |      |      |      |
| Capacity (veh/h)         | 736    | -    | -      | 94    | 148    | 870   | -      | -    |      |      |      |      |
| HCM Lane V/C Ratio       | 0.014  | -    | -      | 0.199 | 0.135  | 0.002 | -      | -    |      |      |      |      |
| HCM Control Delay (s)    | 10     | 0    | -      | 52.6  | 33.1   | 9.1   | 0      | -    |      |      |      |      |
| HCM Lane LOS             | A      | A    | -      | F     | D      | A     | A      | -    |      |      |      |      |
| HCM 95th %tile Q(veh)    | 0      | -    | -      | 0.7   | 0.5    | 0     | -      | -    |      |      |      |      |

12239.00 :: Needham Street  
22: 2nd Avenue/Staples Driveway & Highland Avenue

2018 Existing Conditions  
Timing Plan: Saturday Midday

| Lane Group              | EBL   | EBT   | EBR  | WBL   | WBT   | WBR  | NBL   | NBT   | NBR   | SBL  | SBT   | SBR  |
|-------------------------|-------|-------|------|-------|-------|------|-------|-------|-------|------|-------|------|
| Lane Configurations     |       | ↔     |      |       | ↔     |      |       | ↔     |       |      | ↔     |      |
| Traffic Volume (vph)    | 15    | 525   | 110  | 115   | 750   | 40   | 260   | 15    | 135   | 70   | 10    | 15   |
| Future Volume (vph)     | 15    | 525   | 110  | 115   | 750   | 40   | 260   | 15    | 135   | 70   | 10    | 15   |
| Ideal Flow (vphpl)      | 1900  | 1900  | 1900 | 1900  | 1900  | 1900 | 1900  | 1900  | 1900  | 1900 | 1900  | 1900 |
| Storage Length (ft)     | 0     | 0     | 0    | 0     | 100   | 150  | 100   | 0     | 100   | 0    | 50    | 0    |
| Storage Lanes           | 0     | 0     | 0    | 0     | 1     | 1    | 1     | 0     | 1     | 0    | 1     | 0    |
| Taper Length (ft)       | 25    |       | 25   |       | 25    |      | 25    |       | 25    |      | 25    |      |
| Satd. Flow (prot)       | 0     | 3463  | 0    | 0     | 3559  | 0    | 1698  | 1710  | 1599  | 0    | 1820  | 1615 |
| Flt Permitted           |       | 0.923 |      |       | 0.713 |      | 0.950 | 0.957 |       |      | 0.321 |      |
| Satd. Flow (perm)       | 0     | 3199  | 0    | 0     | 2552  | 0    | 1698  | 1710  | 1561  | 0    | 608   | 1574 |
| Right Turn on Red       |       |       | Yes  |       | Yes   |      |       | Yes   |       |      | Yes   |      |
| Satd. Flow (RTOR)       |       | 31    |      |       | 11    |      |       | 200   |       |      | 200   |      |
| Link Speed (mph)        |       | 30    |      |       | 30    |      |       | 30    |       |      | 30    |      |
| Link Distance (ft)      |       | 210   |      |       | 361   |      |       | 859   |       |      | 290   |      |
| Travel Time (s)         |       | 4.8   |      |       | 8.2   |      |       | 19.5  |       |      | 6.6   |      |
| Confl. Peds. (#/hr)     | 3     |       | 8    | 8     |       | 3    |       |       | 2     | 2    |       |      |
| Confl. Bikes (#/hr)     |       |       | 1    |       |       | 1    |       |       |       |      |       | 1    |
| Peak Hour Factor        | 0.99  | 0.99  | 0.99 | 0.95  | 0.95  | 0.95 | 0.83  | 0.83  | 0.83  | 0.97 | 0.97  | 0.97 |
| Heavy Vehicles (%)      | 1%    | 1%    | 1%   | 0%    | 0%    | 0%   | 1%    | 1%    | 1%    | 0%   | 0%    | 0%   |
| Shared Lane Traffic (%) |       |       |      |       |       |      | 47%   |       |       |      |       |      |
| Lane Group Flow (vph)   | 0     | 656   | 0    | 0     | 952   | 0    | 166   | 165   | 163   | 0    | 82    | 15   |
| Turn Type               | Perm  | NA    |      | pm+pt | NA    |      | Split | NA    | Perm  | Perm | NA    | Perm |
| Protected Phases        |       | 6     |      | 5     | 2     |      | 8     | 8     |       |      | 4     |      |
| Permitted Phases        | 6     |       |      | 2     |       |      |       | 8     | 4     |      | 4     |      |
| Detector Phase          | 6     | 6     |      | 5     | 2     |      | 8     | 8     | 4     |      | 4     | 4    |
| Switch Phase            |       |       |      |       |       |      |       |       |       |      |       |      |
| Minimum Initial (s)     | 15.0  | 15.0  |      | 4.0   | 15.0  |      | 10.0  | 10.0  | 10.0  | 4.0  | 4.0   | 4.0  |
| Minimum Split (s)       | 38.5  | 38.5  |      | 10.5  | 31.5  |      | 29.5  | 29.5  | 29.5  | 10.5 | 10.5  | 10.5 |
| Total Split (s)         | 42.0  | 42.0  |      | 25.0  | 67.0  |      | 15.0  | 15.0  | 15.0  | 8.0  | 8.0   | 8.0  |
| Total Split (%)         | 46.7% | 46.7% |      | 27.8% | 74.4% |      | 16.7% | 16.7% | 16.7% | 8.9% | 8.9%  | 8.9% |
| Yellow Time (s)         | 4.0   | 4.0   |      | 4.0   | 4.0   |      | 3.0   | 3.0   | 3.0   | 3.0  | 3.0   | 3.0  |
| All-Red Time (s)        | 2.5   | 2.5   |      | 2.5   | 2.5   |      | 3.5   | 3.5   | 3.5   | 3.5  | 3.5   | 3.5  |
| Lost Time Adjust (s)    |       | 0.0   |      |       | 0.0   |      | 0.0   | 0.0   | 0.0   |      | 0.0   | 0.0  |
| Total Lost Time (s)     |       | 6.5   |      |       | 6.5   |      | 6.5   | 6.5   | 6.5   |      | 6.5   | 6.5  |
| Lead/Lag                | Lag   | Lag   |      | Lead  |       |      |       |       |       |      |       |      |
| Lead-Lag Optimize?      | Yes   | Yes   |      | Yes   |       |      |       |       |       |      |       |      |
| Recall Mode             | C-Min | C-Min |      | None  | C-Min |      | None  | None  | None  | None | None  | None |
| Act Effect Green (s)    | 45.2  |       |      |       | 45.2  |      | 13.6  | 13.6  | 13.6  |      | 11.7  | 11.7 |
| Actuated g/C Ratio      | 0.50  |       |      |       | 0.50  |      | 0.15  | 0.15  | 0.15  |      | 0.13  | 0.13 |
| v/c Ratio               | 0.40  |       |      |       | 0.74  |      | 0.65  | 0.64  | 0.40  |      | 1.05  | 0.04 |
| Control Delay           | 13.6  |       |      |       | 21.1  |      | 50.8  | 50.3  | 6.3   |      | 160.0 | 0.2  |
| Queue Delay             | 0.0   |       |      |       | 0.0   |      | 0.0   | 0.0   | 0.0   |      | 0.0   | 0.0  |
| Total Delay             | 13.6  |       |      |       | 21.1  |      | 50.8  | 50.3  | 6.3   |      | 160.0 | 0.2  |
| LOS                     | B     |       |      |       | C     |      | D     | D     | A     |      | F     | A    |
| Approach Delay          | 13.6  |       |      |       | 21.1  |      | 36.0  |       |       |      | 135.3 |      |
| Approach LOS            | B     |       |      |       | C     |      | D     |       |       |      | F     |      |
| Queue Length 50th (ft)  | 117   |       |      |       | 225   |      | 91    | 90    | 0     |      | -52   | 0    |
| Queue Length 95th (ft)  | 105   |       |      |       | 202   |      | #212  | #210  | 25    |      | #169  | 0    |
| Internal Link Dist (ft) | 130   |       |      |       | 281   |      |       | 779   |       |      | 210   |      |
| Turn Bay Length (ft)    |       |       |      |       |       |      | 150   |       | 100   |      |       | 50   |
| Base Capacity (vph)     |       | 1621  |      |       | 1719  |      | 256   | 258   | 405   |      | 78    | 378  |
| Starvation Cap Reductn  |       | 0     |      |       | 0     |      | 0     | 0     | 0     |      | 0     | 0    |
| Spillback Cap Reductn   |       | 0     |      |       | 0     |      | 0     | 0     | 0     |      | 0     | 0    |
| Storage Cap Reductn     |       | 0     |      |       | 0     |      | 0     | 0     | 0     |      | 0     | 0    |
| Reduced v/c Ratio       |       | 0.40  |      |       | 0.55  |      | 0.65  | 0.64  | 0.40  |      | 1.05  | 0.04 |

| Intersection Summary                                            |                                                                            |                        |
|-----------------------------------------------------------------|----------------------------------------------------------------------------|------------------------|
| Area Type:                                                      | Other                                                                      |                        |
| Cycle Length:                                                   | 90                                                                         |                        |
| Actuated Cycle Length:                                          | 90                                                                         |                        |
| Offset: 0 (0%):                                                 | Referenced to phase 2:WBTL and 6:EBTL, Start of Green, Master Intersection |                        |
| Natural Cycle:                                                  | 90                                                                         |                        |
| Control Type:                                                   | Actuated-Coordinated                                                       |                        |
| Maximum v/c Ratio:                                              | 1.05                                                                       |                        |
| Intersection Signal Delay:                                      | 27.2                                                                       | Intersection LOS: C    |
| Intersection Capacity Utilization:                              | 82.9%                                                                      | ICU Level of Service E |
| Analysis Period (min)                                           | 15                                                                         |                        |
| ~ Volume exceeds capacity, queue is theoretically infinite.     |                                                                            |                        |
| Queue shown is maximum after two cycles.                        |                                                                            |                        |
| # 95th percentile volume exceeds capacity, queue may be longer. |                                                                            |                        |
| Queue shown is maximum after two cycles.                        |                                                                            |                        |

Lanes, Volumes, Timings  
VHB/MSD

\\vhb\proj\Wat-LD\12239.00\tech\Traffic\Synchro\TIA\_2018\2018 EX\_SAT\_syn  
07/03/2018

12239.00 :: Needham Street  
22: 2nd Avenue/Staples Driveway & Highland Avenue

2018 Existing Conditions  
Timing Plan: Saturday Midday



Lanes, Volumes, Timings  
VHB/MSD

\\vhb\proj\Wat-LD\12239.00\tech\Traffic\Synchro\TIA\_2018\2018 EX\_SAT\_syn  
07/03/2018

12239.00 :: Needham Street  
23: Highland Avenue & Charles Street

2018 Existing Conditions  
Timing Plan: Saturday MIDDAY

| Intersection             |        |      |        |       |      |      |
|--------------------------|--------|------|--------|-------|------|------|
| Int Delay, s/veh         | 3.5    |      |        |       |      |      |
| Movement                 | EBL    | EBT  | WBT    | WBR   | SBL  | SBR  |
| Lane Configurations      |        | ↕↕   | ↕↕     |       | ↕    |      |
| Traffic Vol, veh/h       | 45     | 615  | 1005   | 20    | 35   | 110  |
| Future Vol, veh/h        | 45     | 615  | 1005   | 20    | 35   | 110  |
| Conflicting Peds, #/hr   | 3      | 0    | 0      | 3     | 0    | 0    |
| Sign Control             | Free   | Free | Free   | Free  | Stop | Stop |
| RT Channelized           | -      | None | -      | None  | -    | None |
| Storage Length           | -      | -    | -      | -     | 0    | -    |
| Veh in Median Storage, # | -      | 0    | 0      | -     | 0    | -    |
| Grade, %                 | -      | 0    | 0      | -     | 0    | -    |
| Peak Hour Factor         | 99     | 99   | 99     | 99    | 89   | 89   |
| Heavy Vehicles, %        | 1      | 1    | 1      | 1     | 0    | 0    |
| Mvmt Flow                | 45     | 621  | 1015   | 20    | 39   | 124  |
| Major/Minor              |        |      |        |       |      |      |
| Major1                   | Major2 |      | Minor2 |       |      |      |
| Conflicting Flow All     | 1038   | 0    | -      | 0     | 1430 | 521  |
| Stage 1                  | -      | -    | -      | -     | 1028 | -    |
| Stage 2                  | -      | -    | -      | -     | 402  | -    |
| Critical Hdwy            | 4.12   | -    | -      | -     | 6.8  | 6.9  |
| Critical Hdwy Stg 1      | -      | -    | -      | -     | 5.8  | -    |
| Critical Hdwy Stg 2      | -      | -    | -      | -     | 5.8  | -    |
| Follow-up Hdwy           | 2.21   | -    | -      | -     | 3.5  | 3.3  |
| Pot Cap-1 Maneuver       | 671    | -    | -      | -     | 128  | 505  |
| Stage 1                  | -      | -    | -      | -     | 310  | -    |
| Stage 2                  | -      | -    | -      | -     | 650  | -    |
| Platoon blocked, %       | -      | -    | -      | -     | -    | -    |
| Mov Cap-1 Maneuver       | 671    | -    | -      | -     | 114  | 504  |
| Mov Cap-2 Maneuver       | -      | -    | -      | -     | 114  | -    |
| Stage 1                  | -      | -    | -      | -     | 309  | -    |
| Stage 2                  | -      | -    | -      | -     | 582  | -    |
| Approach                 |        |      |        |       |      |      |
| EB                       | WB     |      | SB     |       |      |      |
| HCM Control Delay, s     | 1.2    | 0    | -      | -     | 35.2 | -    |
| HCM LOS                  | -      | -    | -      | -     | E    | -    |
| Minor Lane/Major Mvmt    |        |      |        |       |      |      |
| EBL                      | EBT    | WBT  | WBR    | SBLn1 |      |      |
| Capacity (veh/h)         | 671    | -    | -      | -     | 276  | -    |
| HCM Lane V/C Ratio       | 0.068  | -    | -      | -     | 0.59 | -    |
| HCM Control Delay (s)    | 10.8   | 0.5  | -      | -     | 35.2 | -    |
| HCM Lane LOS             | B      | A    | -      | -     | E    | -    |
| HCM 95th %tile Q(veh)    | 0.2    | -    | -      | -     | 3.5  | -    |

12239.00 :: Needham Street  
24: Highland Avenue & Wexford Street

2018 Existing Conditions  
Timing Plan: Saturday MIDDAY

| Intersection             |        |      |        |       |       |      |
|--------------------------|--------|------|--------|-------|-------|------|
| Int Delay, s/veh         | 8.4    |      |        |       |       |      |
| Movement                 | EBL    | EBT  | WBT    | WBR   | SBL   | SBR  |
| Lane Configurations      |        | ↕↕   | ↕↕     |       | ↕     |      |
| Traffic Vol, veh/h       | 90     | 625  | 1080   | 35    | 40    | 130  |
| Future Vol, veh/h        | 90     | 625  | 1080   | 35    | 40    | 130  |
| Conflicting Peds, #/hr   | 2      | 0    | 0      | 2     | 0     | 0    |
| Sign Control             | Free   | Free | Free   | Free  | Stop  | Stop |
| RT Channelized           | -      | None | -      | None  | -     | None |
| Storage Length           | -      | -    | -      | -     | 0     | -    |
| Veh in Median Storage, # | -      | 0    | 0      | -     | 0     | -    |
| Grade, %                 | -      | 0    | 0      | -     | 0     | -    |
| Peak Hour Factor         | 97     | 97   | 98     | 98    | 94    | 94   |
| Heavy Vehicles, %        | 0      | 0    | 1      | 1     | 0     | 0    |
| Mvmt Flow                | 93     | 644  | 1102   | 36    | 43    | 138  |
| Major/Minor              |        |      |        |       |       |      |
| Major1                   | Major2 |      | Minor2 |       |       |      |
| Conflicting Flow All     | 1140   | 0    | -      | 0     | 1630  | 571  |
| Stage 1                  | -      | -    | -      | -     | 1122  | -    |
| Stage 2                  | -      | -    | -      | -     | 508   | -    |
| Critical Hdwy            | 4.1    | -    | -      | -     | 6.8   | 6.9  |
| Critical Hdwy Stg 1      | -      | -    | -      | -     | 5.8   | -    |
| Critical Hdwy Stg 2      | -      | -    | -      | -     | 5.8   | -    |
| Follow-up Hdwy           | 2.2    | -    | -      | -     | 3.5   | 3.3  |
| Pot Cap-1 Maneuver       | 620    | -    | -      | -     | 94    | 469  |
| Stage 1                  | -      | -    | -      | -     | 277   | -    |
| Stage 2                  | -      | -    | -      | -     | 575   | -    |
| Platoon blocked, %       | -      | -    | -      | -     | -     | -    |
| Mov Cap-1 Maneuver       | 620    | -    | -      | -     | 72    | 468  |
| Mov Cap-2 Maneuver       | -      | -    | -      | -     | 72    | -    |
| Stage 1                  | -      | -    | -      | -     | 277   | -    |
| Stage 2                  | -      | -    | -      | -     | 440   | -    |
| Approach                 |        |      |        |       |       |      |
| EB                       | WB     |      | SB     |       |       |      |
| HCM Control Delay, s     | 2.5    | 0    | -      | -     | 84.8  | -    |
| HCM LOS                  | -      | -    | -      | -     | F     | -    |
| Minor Lane/Major Mvmt    |        |      |        |       |       |      |
| EBL                      | EBT    | WBT  | WBR    | SBLn1 |       |      |
| Capacity (veh/h)         | 620    | -    | -      | -     | 204   | -    |
| HCM Lane V/C Ratio       | 0.15   | -    | -      | -     | 0.887 | -    |
| HCM Control Delay (s)    | 11.8   | 1.1  | -      | -     | 84.8  | -    |
| HCM Lane LOS             | B      | A    | -      | -     | F     | -    |
| HCM 95th %tile Q(veh)    | 0.5    | -    | -      | -     | 6.9   | -    |

12239.00 :: Needham Street  
25: 1st Avenue/Riverside Community Care Driveway & Highland Avenue

2018 Existing Conditions  
Timing Plan: Saturday MIDDAY

| Intersection             |        |        |      |      |        |       |      |        |      |      |      |      |
|--------------------------|--------|--------|------|------|--------|-------|------|--------|------|------|------|------|
| Int Delay, s/veh         | 0.6    |        |      |      |        |       |      |        |      |      |      |      |
| Movement                 | EBL    | EBT    | EBR  | WBL  | WBT    | WBR   | NBL  | NBT    | NBR  | SBL  | SBT  | SBR  |
| Lane Configurations      |        | ↕↕     | ↕    |      | ↕↕     |       |      |        | ↕    |      |      | ↕    |
| Traffic Vol, veh/h       | 0      | 615    | 85   | 0    | 1210   | 0     | 0    | 0      | 95   | 0    | 0    | 0    |
| Future Vol, veh/h        | 0      | 615    | 85   | 0    | 1210   | 0     | 0    | 0      | 95   | 0    | 0    | 0    |
| Conflicting Peds, #/hr   | 0      | 0      | 1    | 1    | 0      | 0     | 0    | 0      | 0    | 0    | 0    | 0    |
| Sign Control             | Free   | Free   | Free | Free | Free   | Free  | Stop | Stop   | Stop | Stop | Stop | Stop |
| RT Channelized           | -      | -      | None | -    | -      | None  | -    | -      | None | -    | -    | None |
| Storage Length           | -      | -      | 200  | -    | -      | -     | -    | -      | 0    | -    | -    | 0    |
| Veh in Median Storage, # | -      | 0      | -    | -    | 0      | -     | -    | 0      | -    | -    | 0    | -    |
| Grade, %                 | -      | 0      | -    | -    | 0      | -     | -    | 0      | -    | -    | 0    | -    |
| Peak Hour Factor         | 97     | 97     | 97   | 98   | 98     | 98    | 86   | 86     | 86   | 92   | 92   | 92   |
| Heavy Vehicles, %        | 0      | 0      | 0    | 0    | 0      | 0     | 0    | 0      | 0    | 0    | 0    | 0    |
| Mvmt Flow                | 0      | 634    | 88   | 0    | 1235   | 0     | 0    | 0      | 110  | 0    | 0    | 0    |
| Major/Minor              | Major1 | Major2 |      |      | Minor1 |       |      | Minor2 |      |      |      |      |
| Conflicting Flow All     | -      | 0      | 0    | -    | -      | 0     | -    | -      | 318  | -    | -    | 617  |
| Stage 1                  | -      | -      | -    | -    | -      | -     | -    | -      | -    | -    | -    | -    |
| Stage 2                  | -      | -      | -    | -    | -      | -     | -    | -      | -    | -    | -    | -    |
| Critical Hdwy            | -      | -      | -    | -    | -      | -     | -    | -      | 6.9  | -    | -    | 6.9  |
| Critical Hdwy Stg 1      | -      | -      | -    | -    | -      | -     | -    | -      | -    | -    | -    | -    |
| Critical Hdwy Stg 2      | -      | -      | -    | -    | -      | -     | -    | -      | -    | -    | -    | -    |
| Follow-up Hdwy           | -      | -      | -    | -    | -      | -     | -    | -      | 3.3  | -    | -    | 3.3  |
| Pot Cap-1 Maneuver       | 0      | -      | -    | 0    | -      | -     | 0    | 0      | 684  | 0    | 0    | 438  |
| Stage 1                  | 0      | -      | -    | 0    | -      | -     | 0    | 0      | -    | 0    | 0    | -    |
| Stage 2                  | 0      | -      | -    | 0    | -      | -     | 0    | 0      | -    | 0    | 0    | -    |
| Platoon blocked, %       | -      | -      | -    | -    | -      | -     | -    | -      | -    | -    | -    | -    |
| Mov Cap-1 Maneuver       | -      | -      | -    | -    | -      | -     | -    | -      | 683  | -    | -    | 438  |
| Mov Cap-2 Maneuver       | -      | -      | -    | -    | -      | -     | -    | -      | -    | -    | -    | -    |
| Stage 1                  | -      | -      | -    | -    | -      | -     | -    | -      | -    | -    | -    | -    |
| Stage 2                  | -      | -      | -    | -    | -      | -     | -    | -      | -    | -    | -    | -    |
| Approach                 | EB     | WB     |      |      | NB     |       |      | SB     |      |      |      |      |
| HCM Control Delay, s     | 0      | 0      |      |      | 11.3   |       |      | 0      |      |      |      |      |
| HCM LOS                  |        |        |      |      | B      |       |      | A      |      |      |      |      |
| Minor Lane/Major Mvmt    | NBLn1  | EBT    | EBR  | WBT  | WBR    | SBLn1 |      |        |      |      |      |      |
| Capacity (veh/h)         | 683    | -      | -    | -    | -      | -     |      |        |      |      |      |      |
| HCM Lane V/C Ratio       | 0.162  | -      | -    | -    | -      | -     |      |        |      |      |      |      |
| HCM Control Delay (s)    | 11.3   | -      | -    | -    | -      | 0     |      |        |      |      |      |      |
| HCM Lane LOS             | B      | -      | -    | -    | -      | A     |      |        |      |      |      |      |
| HCM 95th %tile Q(veh)    | 0.6    | -      | -    | -    | -      | -     |      |        |      |      |      |      |

12239.00 :: Needham Street  
26: I-95 NB Ramps & Highland Avenue

2018 Existing Conditions  
Timing Plan: Saturday MIDDAY

| Intersection             |        |        |       |      |        |       |      |        |       |      |      |       |
|--------------------------|--------|--------|-------|------|--------|-------|------|--------|-------|------|------|-------|
| Int Delay, s/veh         | 1.5    |        |       |      |        |       |      |        |       |      |      |       |
| Movement                 | EBL    | EBT    | EBR   | WBL  | WBT    | WBR   | NBL  | NBT    | NBR   | SBL  | SBT  | SBR   |
| Lane Configurations      |        | ↕↕     | ↕     |      | ↕↕     |       |      |        | ↕     |      |      | ↕     |
| Traffic Vol, veh/h       | 0      | 505    | 380   | 0    | 805    | 405   | 0    | 0      | 195   | 0    | 0    | 80    |
| Future Vol, veh/h        | 0      | 505    | 380   | 0    | 805    | 405   | 0    | 0      | 195   | 0    | 0    | 80    |
| Conflicting Peds, #/hr   | 0      | 0      | 2     | 2    | 0      | 0     | 0    | 0      | 2     | 0    | 0    | 0     |
| Sign Control             | Free   | Free   | Free  | Free | Free   | Free  | Stop | Stop   | Stop  | Stop | Stop | Stop  |
| RT Channelized           | -      | -      | Yield | -    | -      | Yield | -    | -      | Yield | -    | -    | Yield |
| Storage Length           | -      | -      | 0     | -    | -      | -     | -    | -      | 0     | -    | -    | 0     |
| Veh in Median Storage, # | -      | 0      | -     | -    | 0      | -     | -    | 0      | -     | -    | 0    | -     |
| Grade, %                 | -      | 0      | -     | -    | 0      | -     | -    | 0      | -     | -    | 0    | -     |
| Peak Hour Factor         | 98     | 98     | 98    | 93   | 93     | 93    | 88   | 88     | 88    | 89   | 89   | 89    |
| Heavy Vehicles, %        | 0      | 0      | 0     | 1    | 1      | 1     | 1    | 1      | 1     | 0    | 0    | 0     |
| Mvmt Flow                | 0      | 515    | 388   | 0    | 866    | 435   | 0    | 0      | 222   | 0    | 0    | 90    |
| Major/Minor              | Major1 | Major2 |       |      | Minor1 |       |      | Minor2 |       |      |      |       |
| Conflicting Flow All     | -      | 0      | 0     | -    | -      | 0     | -    | 262    | -     | -    | 433  | -     |
| Stage 1                  | -      | -      | -     | -    | -      | -     | -    | -      | -     | -    | -    | -     |
| Stage 2                  | -      | -      | -     | -    | -      | -     | -    | -      | -     | -    | -    | -     |
| Critical Hdwy            | -      | -      | -     | -    | -      | -     | -    | 6.92   | -     | -    | 6.9  | -     |
| Critical Hdwy Stg 1      | -      | -      | -     | -    | -      | -     | -    | -      | -     | -    | -    | -     |
| Critical Hdwy Stg 2      | -      | -      | -     | -    | -      | -     | -    | -      | -     | -    | -    | -     |
| Follow-up Hdwy           | -      | -      | -     | -    | -      | -     | -    | 3.31   | -     | -    | 3.3  | -     |
| Pot Cap-1 Maneuver       | 0      | -      | -     | 0    | -      | 0     | 0    | 740    | 0     | 0    | 576  | -     |
| Stage 1                  | 0      | -      | -     | 0    | -      | 0     | 0    | -      | 0     | 0    | -    | -     |
| Stage 2                  | 0      | -      | -     | 0    | -      | 0     | 0    | -      | 0     | 0    | -    | -     |
| Platoon blocked, %       | -      | -      | -     | -    | -      | -     | -    | -      | -     | -    | -    | -     |
| Mov Cap-1 Maneuver       | -      | -      | -     | -    | -      | -     | -    | 738    | -     | -    | 576  | -     |
| Mov Cap-2 Maneuver       | -      | -      | -     | -    | -      | -     | -    | -      | -     | -    | -    | -     |
| Stage 1                  | -      | -      | -     | -    | -      | -     | -    | -      | -     | -    | -    | -     |
| Stage 2                  | -      | -      | -     | -    | -      | -     | -    | -      | -     | -    | -    | -     |
| Approach                 | EB     | WB     |       |      | NB     |       |      | SB     |       |      |      |       |
| HCM Control Delay, s     | 0      | 0      |       |      | 12     |       |      | 12.4   |       |      |      |       |
| HCM LOS                  |        |        |       |      | B      |       |      | B      |       |      |      |       |
| Minor Lane/Major Mvmt    | NBLn1  | EBT    | EBR   | WBT  | WBR    | SBLn1 |      |        |       |      |      |       |
| Capacity (veh/h)         | 738    | -      | -     | -    | -      | 576   |      |        |       |      |      |       |
| HCM Lane V/C Ratio       | 0.3    | -      | -     | -    | -      | 0.156 |      |        |       |      |      |       |
| HCM Control Delay (s)    | 12     | -      | -     | -    | -      | 12.4  |      |        |       |      |      |       |
| HCM Lane LOS             | B      | -      | -     | -    | -      | B     |      |        |       |      |      |       |
| HCM 95th %ile Q(veh)     | 1.3    | -      | -     | -    | -      | 0.6   |      |        |       |      |      |       |

12239.00 :: Needham Street  
27: I-95 SB Ramps & Highland Avenue

2018 Existing Conditions  
Timing Plan: Saturday MIDDAY

| Intersection             |        |      |       |        |      |       |        |      |       |        |      |       |
|--------------------------|--------|------|-------|--------|------|-------|--------|------|-------|--------|------|-------|
| Int Delay, s/veh         | 5.4    |      |       |        |      |       |        |      |       |        |      |       |
| Movement                 | EBL    | EBT  | EBR   | WBL    | WBT  | WBR   | NBL    | NBT  | NBR   | SBL    | SBT  | SBR   |
| Lane Configurations      |        | ↕↕   |       |        | ↕↕   | ↕     |        |      | ↕     |        | ↕    | ↕     |
| Traffic Vol, veh/h       | 0      | 625  | 150   | 0      | 630  | 255   | 0      | 0    | 260   | 0      | 0    | 420   |
| Future Vol, veh/h        | 0      | 625  | 150   | 0      | 630  | 255   | 0      | 0    | 260   | 0      | 0    | 420   |
| Conflicting Peds, #/hr   | 0      | 0    | 2     | 2      | 0    | 0     | 0      | 0    | 2     | 0      | 0    | 0     |
| Sign Control             | Free   | Free | Free  | Free   | Free | Free  | Stop   | Stop | Stop  | Stop   | Stop | Stop  |
| RT Channelized           | -      | -    | Yield | -      | -    | Yield | -      | -    | Yield | -      | -    | Yield |
| Storage Length           | -      | -    | -     | -      | -    | 0     | -      | -    | 0     | -      | -    | 0     |
| Veh in Median Storage, # | -      | 0    | -     | -      | 0    | -     | -      | 0    | -     | -      | 0    | -     |
| Grade, %                 | -      | 0    | -     | -      | 0    | -     | -      | 0    | -     | -      | 0    | -     |
| Peak Hour Factor         | 97     | 97   | 97    | 90     | 90   | 90    | 92     | 92   | 92    | 95     | 95   | 95    |
| Heavy Vehicles, %        | 0      | 0    | 0     | 1      | 1    | 1     | 1      | 1    | 1     | 0      | 0    | 0     |
| Mvmt Flow                | 0      | 644  | 155   | 0      | 700  | 283   | 0      | 0    | 283   | 0      | 0    | 442   |
| Major/Minor              | Major1 |      |       | Major2 |      |       | Minor1 |      |       | Minor2 |      |       |
| Conflicting Flow All     | -      | 0    | 0     | -      | -    | 0     | -      | -    | 326   | -      | -    | 350   |
| Stage 1                  | -      | -    | -     | -      | -    | -     | -      | -    | -     | -      | -    | -     |
| Stage 2                  | -      | -    | -     | -      | -    | -     | -      | -    | -     | -      | -    | -     |
| Critical Hdwy            | -      | -    | -     | -      | -    | -     | -      | -    | 6.92  | -      | -    | 6.9   |
| Critical Hdwy Stg 1      | -      | -    | -     | -      | -    | -     | -      | -    | -     | -      | -    | -     |
| Critical Hdwy Stg 2      | -      | -    | -     | -      | -    | -     | -      | -    | -     | -      | -    | -     |
| Follow-up Hdwy           | -      | -    | -     | -      | -    | -     | -      | -    | 3.31  | -      | -    | 3.3   |
| Pot Cap-1 Maneuver       | 0      | -    | -     | 0      | -    | -     | 0      | 0    | 673   | 0      | 0    | 652   |
| Stage 1                  | 0      | -    | -     | 0      | -    | -     | 0      | 0    | -     | 0      | 0    | -     |
| Stage 2                  | 0      | -    | -     | 0      | -    | -     | 0      | 0    | -     | 0      | 0    | -     |
| Platoon blocked, %       | -      | -    | -     | -      | -    | -     | -      | -    | -     | -      | -    | -     |
| Mov Cap-1 Maneuver       | -      | -    | -     | -      | -    | -     | -      | -    | 671   | -      | -    | 652   |
| Mov Cap-2 Maneuver       | -      | -    | -     | -      | -    | -     | -      | -    | -     | -      | -    | -     |
| Stage 1                  | -      | -    | -     | -      | -    | -     | -      | -    | -     | -      | -    | -     |
| Stage 2                  | -      | -    | -     | -      | -    | -     | -      | -    | -     | -      | -    | -     |
| Approach                 | EB     |      |       | WB     |      |       | NB     |      |       | SB     |      |       |
| HCM Control Delay, s     | 0      |      |       | 0      |      |       | 14.2   |      |       | 21.3   |      |       |
| HCM LOS                  |        |      |       |        |      |       | B      |      |       | C      |      |       |
| Minor Lane/Major Mvmt    | NBLn1  | EBT  | EBR   | WBT    | WBR  | SBLn1 |        |      |       |        |      |       |
| Capacity (veh/h)         | 671    | -    | -     | -      | -    | 652   |        |      |       |        |      |       |
| HCM Lane V/C Ratio       | 0.421  | -    | -     | -      | -    | 0.678 |        |      |       |        |      |       |
| HCM Control Delay (s)    | 14.2   | -    | -     | -      | -    | 21.3  |        |      |       |        |      |       |
| HCM Lane LOS             | B      | -    | -     | -      | -    | C     |        |      |       |        |      |       |
| HCM 95th %tile Q(veh)    | 2.1    | -    | -     | -      | -    | 5.3   |        |      |       |        |      |       |

12239.00 :: Needham Street  
1: Chestnut Street & Route 9 WB Access Road

2025 No Build Conditions  
Timing Plan: Weekday Morning

| Intersection               |       |       |       |       |      |      |       |      |      |      |      |      |
|----------------------------|-------|-------|-------|-------|------|------|-------|------|------|------|------|------|
| Intersection Delay, s/veh  | 86.4  |       |       |       |      |      |       |      |      |      |      |      |
| Intersection LOS           | F     |       |       |       |      |      |       |      |      |      |      |      |
| Movement                   | EBL   | EBT   | EBR   | WBL   | WBT  | WBR  | NBL   | NBT  | NBR  | SBL  | SBT  | SBR  |
| Lane Configurations        |       | ↕     |       |       | ↕    |      |       | ↕    |      |      | ↕    |      |
| Traffic Vol, veh/h         | 30    | 1     | 10    | 50    | 105  | 35   | 65    | 605  | 1    | 0    | 350  | 265  |
| Future Vol, veh/h          | 30    | 1     | 10    | 50    | 105  | 35   | 65    | 605  | 1    | 0    | 350  | 265  |
| Peak Hour Factor           | 0.92  | 0.92  | 0.92  | 0.92  | 0.92 | 0.92 | 0.92  | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Heavy Vehicles, %          | 0     | 0     | 0     | 0     | 0    | 0    | 0     | 0    | 0    | 0    | 0    | 0    |
| Mvmt Flow                  | 33    | 1     | 11    | 54    | 114  | 38   | 71    | 658  | 1    | 0    | 380  | 288  |
| Number of Lanes            | 0     | 1     | 0     | 0     | 1    | 0    | 0     | 1    | 0    | 0    | 1    | 0    |
| Approach                   | EB    |       |       | WB    |      |      | NB    |      |      | SB   |      |      |
| Opposing Approach          | WB    |       |       | EB    |      |      | SB    |      |      | NB   |      |      |
| Opposing Lanes             | 1     |       |       | 1     |      |      | 1     |      |      | 1    |      |      |
| Conflicting Approach Left  | SB    |       |       | NB    |      |      | EB    |      |      | WB   |      |      |
| Conflicting Lanes Left     | 1     |       |       | 1     |      |      | 1     |      |      | 1    |      |      |
| Conflicting Approach Right | NB    |       |       | SB    |      |      | WB    |      |      | EB   |      |      |
| Conflicting Lanes Right    | 1     |       |       | 1     |      |      | 1     |      |      | 1    |      |      |
| HCM Control Delay          | 12.6  |       |       | 15.9  |      |      | 124.1 |      |      | 71.9 |      |      |
| HCM LOS                    | B     |       |       | C     |      |      | F     |      |      | F    |      |      |
|                            |       |       |       |       |      |      |       |      |      |      |      |      |
| Lane                       | NBLn1 | EBLn1 | WBLn1 | SBLn1 |      |      |       |      |      |      |      |      |
| Vol Left, %                | 10%   | 73%   | 26%   | 0%    |      |      |       |      |      |      |      |      |
| Vol Thru, %                | 90%   | 2%    | 55%   | 57%   |      |      |       |      |      |      |      |      |
| Vol Right, %               | 0%    | 24%   | 18%   | 43%   |      |      |       |      |      |      |      |      |
| Sign Control               | Stop  | Stop  | Stop  | Stop  |      |      |       |      |      |      |      |      |
| Traffic Vol by Lane        | 671   | 41    | 190   | 615   |      |      |       |      |      |      |      |      |
| LT Vol                     | 65    | 30    | 50    | 0     |      |      |       |      |      |      |      |      |
| Through Vol                | 605   | 1     | 105   | 350   |      |      |       |      |      |      |      |      |
| RT Vol                     | 1     | 10    | 35    | 265   |      |      |       |      |      |      |      |      |
| Lane Flow Rate             | 729   | 45    | 207   | 668   |      |      |       |      |      |      |      |      |
| Geometry Grp               | 1     | 1     | 1     | 1     |      |      |       |      |      |      |      |      |
| Degree of Util (X)         | 1.193 | 0.1   | 0.413 | 1.042 |      |      |       |      |      |      |      |      |
| Departure Headway (Hd)     | 6.038 | 8.66  | 7.663 | 5.92  |      |      |       |      |      |      |      |      |
| Convergence, Y/N           | Yes   | Yes   | Yes   | Yes   |      |      |       |      |      |      |      |      |
| Cap                        | 605   | 416   | 473   | 615   |      |      |       |      |      |      |      |      |
| Service Time               | 4.038 | 6.66  | 5.663 | 3.92  |      |      |       |      |      |      |      |      |
| HCM Lane V/C Ratio         | 1.205 | 0.108 | 0.438 | 1.086 |      |      |       |      |      |      |      |      |
| HCM Control Delay          | 124.1 | 12.6  | 15.9  | 71.9  |      |      |       |      |      |      |      |      |
| HCM Lane LOS               | F     | B     | C     | F     |      |      |       |      |      |      |      |      |
| HCM 95th-tile Q            | 25    | 0.3   | 2     | 17.1  |      |      |       |      |      |      |      |      |

12239.00 :: Needham Street  
2: Chestnut Street & Route 9 EB Access Road

2025 No Build Conditions  
Timing Plan: Weekday Morning

| Intersection               |      |      |      |      |      |      |      |      |      |      |      |      |
|----------------------------|------|------|------|------|------|------|------|------|------|------|------|------|
| Intersection Delay, s/veh  | 27   |      |      |      |      |      |      |      |      |      |      |      |
| Intersection LOS           | D    |      |      |      |      |      |      |      |      |      |      |      |
| Movement                   | EBL  | EBT  | EBR  | WBL  | WBT  | WBR  | NBL  | NBT  | NBR  | SBL  | SBT  | SBR  |
| Lane Configurations        | ↔    |      |      | ↔    |      |      | ↔    |      |      | ↔    |      |      |
| Traffic Vol, veh/h         | 255  | 50   | 20   | 0    | 5    | 40   | 2    | 375  | 55   | 70   | 335  | 2    |
| Future Vol, veh/h          | 255  | 50   | 20   | 0    | 5    | 40   | 2    | 375  | 55   | 70   | 335  | 2    |
| Peak Hour Factor           | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Heavy Vehicles, %          | 0    | 0    | 0    | 0    | 0    | 0    | 1    | 1    | 1    | 0    | 0    | 0    |
| Mvmt Flow                  | 277  | 54   | 22   | 0    | 5    | 43   | 2    | 408  | 60   | 76   | 364  | 2    |
| Number of Lanes            | 0    | 1    | 0    | 0    | 1    | 0    | 0    | 1    | 0    | 0    | 1    | 0    |
| Approach                   | EB   |      |      | WB   |      |      | NB   |      |      | SB   |      |      |
| Opposing Approach          | WB   |      |      | EB   |      |      | SB   |      |      | NB   |      |      |
| Opposing Lanes             | 1    |      |      | 1    |      |      | 1    |      |      | 1    |      |      |
| Conflicting Approach Left  | SB   |      |      | NB   |      |      | EB   |      |      | WB   |      |      |
| Conflicting Lanes Left     | 1    |      |      | 1    |      |      | 1    |      |      | 1    |      |      |
| Conflicting Approach Right | NB   |      |      | SB   |      |      | WB   |      |      | EB   |      |      |
| Conflicting Lanes Right    | 1    |      |      | 1    |      |      | 1    |      |      | 1    |      |      |
| HCM Control Delay          | 22.9 |      |      | 11.3 |      |      | 30.6 |      |      | 28.3 |      |      |
| HCM LOS                    | C    |      |      | B    |      |      | D    |      |      | D    |      |      |

| Lane                   | NBLn1 | EBLn1 | WBLn1 | SBLn1 |
|------------------------|-------|-------|-------|-------|
| Vol Left, %            | 0%    | 78%   | 0%    | 17%   |
| Vol Thru, %            | 87%   | 15%   | 11%   | 82%   |
| Vol Right, %           | 13%   | 6%    | 89%   | 0%    |
| Sign Control           | Stop  | Stop  | Stop  | Stop  |
| Traffic Vol by Lane    | 432   | 325   | 45    | 407   |
| LT Vol                 | 2     | 255   | 0     | 70    |
| Through Vol            | 375   | 50    | 5     | 335   |
| RT Vol                 | 55    | 20    | 40    | 2     |
| Lane Flow Rate         | 470   | 353   | 49    | 442   |
| Geometry Grp           | 1     | 1     | 1     | 1     |
| Degree of Util (X)     | 0.809 | 0.672 | 0.101 | 0.778 |
| Departure Headway (Hd) | 6.201 | 6.847 | 7.453 | 6.33  |
| Convergence, Y/N       | Yes   | Yes   | Yes   | Yes   |
| Cap                    | 582   | 526   | 484   | 571   |
| Service Time           | 4.27  | 4.914 | 5.453 | 4.4   |
| HCM Lane V/C Ratio     | 0.808 | 0.671 | 0.101 | 0.774 |
| HCM Control Delay      | 30.6  | 22.9  | 11.3  | 28.3  |
| HCM Lane LOS           | D     | C     | B     | D     |
| HCM 95th-ile Q         | 8     | 5     | 0.3   | 7.2   |

12239.00 :: Needham Street  
3: Chestnut Street & Elliot Street

2025 No Build Conditions  
Timing Plan: Weekday Morning

|                         |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|-------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
| Lane Group              | EBL                                                                                 | EBT                                                                                 | EBR                                                                                 | WBL                                                                                 | WBT                                                                                 | WBR                                                                                 | NBL                                                                                 | NBT                                                                                 | NBR                                                                                 | SBL                                                                                 | SBT                                                                                 | SBR                                                                                 | Ø3                                                                                  |                                                                                     |                                                                                     |
| Lane Configurations     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Traffic Volume (vph)    | 370                                                                                 | 270                                                                                 | 40                                                                                  | 5                                                                                   | 55                                                                                  | 35                                                                                  | 40                                                                                  | 180                                                                                 | 5                                                                                   | 30                                                                                  | 270                                                                                 | 170                                                                                 |                                                                                     |                                                                                     |                                                                                     |
| Future Volume (vph)     | 370                                                                                 | 270                                                                                 | 40                                                                                  | 5                                                                                   | 55                                                                                  | 35                                                                                  | 40                                                                                  | 180                                                                                 | 5                                                                                   | 30                                                                                  | 270                                                                                 | 170                                                                                 |                                                                                     |                                                                                     |                                                                                     |
| Ideal Flow (vphpl)      | 1900                                                                                | 1900                                                                                | 1900                                                                                | 1900                                                                                | 1900                                                                                | 1900                                                                                | 1900                                                                                | 1900                                                                                | 1900                                                                                | 1900                                                                                | 1900                                                                                | 1900                                                                                |                                                                                     |                                                                                     |                                                                                     |
| Satd. Flow (prot)       | 0                                                                                   | 1832                                                                                | 0                                                                                   | 0                                                                                   | 1801                                                                                | 0                                                                                   | 0                                                                                   | 1840                                                                                | 0                                                                                   | 0                                                                                   | 1787                                                                                | 0                                                                                   |                                                                                     |                                                                                     |                                                                                     |
| Flt Permitted           |                                                                                     | 0.774                                                                               |                                                                                     |                                                                                     | 0.971                                                                               |                                                                                     |                                                                                     | 0.815                                                                               |                                                                                     |                                                                                     | 0.967                                                                               |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Satd. Flow (perm)       | 0                                                                                   | 1457                                                                                | 0                                                                                   | 0                                                                                   | 1753                                                                                | 0                                                                                   | 0                                                                                   | 1513                                                                                | 0                                                                                   | 0                                                                                   | 1734                                                                                | 0                                                                                   |                                                                                     |                                                                                     |                                                                                     |
| Right Turn on Red       |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Satd. Flow (RTOR)       |                                                                                     | 4                                                                                   |                                                                                     |                                                                                     | 36                                                                                  |                                                                                     |                                                                                     | 1                                                                                   |                                                                                     |                                                                                     | 35                                                                                  |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Link Speed (mph)        |                                                                                     | 30                                                                                  |                                                                                     |                                                                                     | 30                                                                                  |                                                                                     |                                                                                     | 30                                                                                  |                                                                                     |                                                                                     | 30                                                                                  |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Link Distance (ft)      |                                                                                     | 764                                                                                 |                                                                                     |                                                                                     | 972                                                                                 |                                                                                     |                                                                                     | 2055                                                                                |                                                                                     |                                                                                     | 1553                                                                                |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Travel Time (s)         |                                                                                     | 17.4                                                                                |                                                                                     |                                                                                     | 22.1                                                                                |                                                                                     |                                                                                     | 46.7                                                                                |                                                                                     |                                                                                     | 35.3                                                                                |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Confl. Peds. (#/hr)     |                                                                                     |                                                                                     | 1                                                                                   | 1                                                                                   |                                                                                     |                                                                                     | 1                                                                                   |                                                                                     | 1                                                                                   | 1                                                                                   |                                                                                     | 1                                                                                   |                                                                                     |                                                                                     |                                                                                     |
| Peak Hour Factor        | 0.92                                                                                | 0.92                                                                                | 0.92                                                                                | 0.92                                                                                | 0.92                                                                                | 0.92                                                                                | 0.92                                                                                | 0.92                                                                                | 0.92                                                                                | 0.92                                                                                | 0.92                                                                                | 0.92                                                                                |                                                                                     |                                                                                     |                                                                                     |
| Heavy Vehicles (%)      | 0%                                                                                  | 0%                                                                                  | 0%                                                                                  | 0%                                                                                  | 0%                                                                                  | 0%                                                                                  | 2%                                                                                  | 2%                                                                                  | 2%                                                                                  | 0%                                                                                  | 0%                                                                                  | 0%                                                                                  |                                                                                     |                                                                                     |                                                                                     |
| Shared Lane Traffic (%) |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Lane Group Flow (vph)   | 0                                                                                   | 738                                                                                 | 0                                                                                   | 0                                                                                   | 103                                                                                 | 0                                                                                   | 0                                                                                   | 244                                                                                 | 0                                                                                   | 0                                                                                   | 511                                                                                 | 0                                                                                   |                                                                                     |                                                                                     |                                                                                     |
| Turn Type               | Perm                                                                                | NA                                                                                  |                                                                                     | Perm                                                                                | NA                                                                                  |                                                                                     | Perm                                                                                | NA                                                                                  |                                                                                     | Perm                                                                                | NA                                                                                  |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Protected Phases        |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Permitted Phases        | 1                                                                                   | 1                                                                                   |                                                                                     | 1                                                                                   | 1                                                                                   |                                                                                     | 2                                                                                   | 2                                                                                   |                                                                                     | 2                                                                                   | 2                                                                                   |                                                                                     | 3                                                                                   |                                                                                     |                                                                                     |
| Detector Phase          | 1                                                                                   | 1                                                                                   |                                                                                     | 1                                                                                   | 1                                                                                   |                                                                                     | 2                                                                                   | 2                                                                                   |                                                                                     | 2                                                                                   | 2                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Switch Phase            |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Minimum Initial (s)     | 6.0                                                                                 | 6.0                                                                                 |                                                                                     | 6.0                                                                                 | 6.0                                                                                 |                                                                                     | 6.0                                                                                 | 6.0                                                                                 |                                                                                     | 6.0                                                                                 | 6.0                                                                                 |                                                                                     | 4.0                                                                                 |                                                                                     |                                                                                     |
| Minimum Split (s)       | 11.0                                                                                | 11.0                                                                                |                                                                                     | 11.0                                                                                | 11.0                                                                                |                                                                                     | 11.0                                                                                | 11.0                                                                                |                                                                                     | 11.0                                                                                | 11.0                                                                                |                                                                                     | 19.0                                                                                |                                                                                     |                                                                                     |
| Total Split (s)         | 35.0                                                                                | 35.0                                                                                |                                                                                     | 35.0                                                                                | 35.0                                                                                |                                                                                     | 35.0                                                                                | 35.0                                                                                |                                                                                     | 35.0                                                                                | 35.0                                                                                |                                                                                     | 19.0                                                                                |                                                                                     |                                                                                     |
| Total Split (%)         | 39.3%                                                                               | 39.3%                                                                               |                                                                                     | 39.3%                                                                               | 39.3%                                                                               |                                                                                     | 39.3%                                                                               | 39.3%                                                                               |                                                                                     | 39.3%                                                                               | 39.3%                                                                               |                                                                                     | 21%                                                                                 |                                                                                     |                                                                                     |
| Yellow Time (s)         | 3.0                                                                                 | 3.0                                                                                 |                                                                                     | 3.0                                                                                 | 3.0                                                                                 |                                                                                     | 3.0                                                                                 | 3.0                                                                                 |                                                                                     | 3.0                                                                                 | 3.0                                                                                 |                                                                                     | 3.0                                                                                 |                                                                                     |                                                                                     |
| All-Red Time (s)        | 2.0                                                                                 | 2.0                                                                                 |                                                                                     | 2.0                                                                                 | 2.0                                                                                 |                                                                                     | 2.0                                                                                 | 2.0                                                                                 |                                                                                     | 2.0                                                                                 | 2.0                                                                                 |                                                                                     | 1.0                                                                                 |                                                                                     |                                                                                     |
| Lost Time Adjust (s)    |                                                                                     | 0.0                                                                                 |                                                                                     |                                                                                     | 0.0                                                                                 |                                                                                     |                                                                                     | 0.0                                                                                 |                                                                                     |                                                                                     | 0.0                                                                                 |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Total Lost Time (s)     |                                                                                     | 5.0                                                                                 |                                                                                     |                                                                                     | 5.0                                                                                 |                                                                                     |                                                                                     | 5.0                                                                                 |                                                                                     |                                                                                     | 5.0                                                                                 |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Lead/Lag                | Lead                                                                                | Lead                                                                                |                                                                                     | Lead                                                                                | Lead                                                                                |                                                                                     | Lag                                                                                 | Lag                                                                                 |                                                                                     | Lag                                                                                 | Lag                                                                                 |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Lead-Lag Optimize?      |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Recall Mode             | None                                                                                | None                                                                                |                                                                                     | None                                                                                | None                                                                                |                                                                                     | None                                                                                | None                                                                                |                                                                                     | None                                                                                | None                                                                                |                                                                                     | None                                                                                |                                                                                     |                                                                                     |
| Act Effct Green (s)     |                                                                                     | 30.8                                                                                |                                                                                     |                                                                                     | 30.8                                                                                |                                                                                     |                                                                                     | 23.2                                                                                |                                                                                     |                                                                                     | 23.2                                                                                |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Actuated g/C Ratio      |                                                                                     | 0.46                                                                                |                                                                                     |                                                                                     | 0.46                                                                                |                                                                                     |                                                                                     | 0.35                                                                                |                                                                                     |                                                                                     | 0.35                                                                                |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| v/c Ratio               |                                                                                     | 1.10                                                                                |                                                                                     |                                                                                     | 0.13                                                                                |                                                                                     |                                                                                     | 0.47                                                                                |                                                                                     |                                                                                     | 0.82                                                                                |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Control Delay           |                                                                                     | 89.2                                                                                |                                                                                     |                                                                                     | 11.0                                                                                |                                                                                     |                                                                                     | 21.2                                                                                |                                                                                     |                                                                                     | 32.0                                                                                |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Queue Delay             |                                                                                     | 0.0                                                                                 |                                                                                     |                                                                                     | 0.0                                                                                 |                                                                                     |                                                                                     | 0.0                                                                                 |                                                                                     |                                                                                     | 0.0                                                                                 |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Total Delay             |                                                                                     | 89.2                                                                                |                                                                                     |                                                                                     | 11.0                                                                                |                                                                                     |                                                                                     | 21.2                                                                                |                                                                                     |                                                                                     | 32.0                                                                                |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| LOS                     |                                                                                     | F                                                                                   |                                                                                     |                                                                                     | B                                                                                   |                                                                                     |                                                                                     | C                                                                                   |                                                                                     |                                                                                     | C                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Approach Delay          |                                                                                     | 89.2                                                                                |                                                                                     |                                                                                     | 11.0                                                                                |                                                                                     |                                                                                     | 21.2                                                                                |                                                                                     |                                                                                     | 32.0                                                                                |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Approach LOS            |                                                                                     | F                                                                                   |                                                                                     |                                                                                     | B                                                                                   |                                                                                     |                                                                                     | C                                                                                   |                                                                                     |                                                                                     | C                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Queue Length 50th (ft)  |                                                                                     | ~326                                                                                |                                                                                     |                                                                                     | 13                                                                                  |                                                                                     |                                                                                     | 68                                                                                  |                                                                                     |                                                                                     | 157                                                                                 |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Queue Length 95th (ft)  |                                                                                     | #805                                                                                |                                                                                     |                                                                                     | 61                                                                                  |                                                                                     |                                                                                     | 177                                                                                 |                                                                                     |                                                                                     | #424                                                                                |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Internal Link Dist (ft) |                                                                                     | 684                                                                                 |                                                                                     |                                                                                     | 892                                                                                 |                                                                                     |                                                                                     | 1975                                                                                |                                                                                     |                                                                                     | 1473                                                                                |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Turn Bay Length (ft)    |                                                                                     | 670                                                                                 |                                                                                     |                                                                                     | 823                                                                                 |                                                                                     |                                                                                     | 694                                                                                 |                                                                                     |                                                                                     | 814                                                                                 |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Starvation Cap Reductn  |                                                                                     | 0                                                                                   |                                                                                     |                                                                                     | 0                                                                                   |                                                                                     |                                                                                     | 0                                                                                   |                                                                                     |                                                                                     | 0                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Spillback Cap Reductn   |                                                                                     | 0                                                                                   |                                                                                     |                                                                                     | 0                                                                                   |                                                                                     |                                                                                     | 0                                                                                   |                                                                                     |                                                                                     | 0                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Storage Cap Reductn     |                                                                                     | 0                                                                                   |                                                                                     |                                                                                     | 0                                                                                   |                                                                                     |                                                                                     | 0                                                                                   |                                                                                     |                                                                                     | 0                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Reduced v/c Ratio       |                                                                                     | 1.10                                                                                |                                                                                     |                                                                                     | 0.13                                                                                |                                                                                     |                                                                                     | 0.35                                                                                |                                                                                     |                                                                                     | 0.63                                                                                |                                                                                     |                                                                                     |                                                                                     |                                                                                     |

| Intersection Summary                                            |                        |  |
|-----------------------------------------------------------------|------------------------|--|
| Area Type:                                                      | Other                  |  |
| Cycle Length: 89                                                |                        |  |
| Actuated Cycle Length: 67.2                                     |                        |  |
| Natural Cycle: 130                                              |                        |  |
| Control Type: Actuated-Uncoordinated                            |                        |  |
| Maximum v/c Ratio: 1.10                                         |                        |  |
| Intersection Signal Delay: 55.5                                 | Intersection LOS: E    |  |
| Intersection Capacity Utilization 81.0%                         | ICU Level of Service D |  |
| Analysis Period (min) 15                                        |                        |  |
| ~ Volume exceeds capacity, queue is theoretically infinite.     |                        |  |
| Queue shown is maximum after two cycles.                        |                        |  |
| # 95th percentile volume exceeds capacity, queue may be longer. |                        |  |
| Queue shown is maximum after two cycles.                        |                        |  |



12239.00 :: Needham Street  
4: Oak Street & Chestnut Street

2025 No Build Conditions  
Timing Plan: Weekday Morning

| Lane Group              | EBL   | EBT   | EBR  | WBL   | WBT   | WBR  | NBL   | NBT   | NBR  | SBL   | SBT   | SBR  | Ø3   |
|-------------------------|-------|-------|------|-------|-------|------|-------|-------|------|-------|-------|------|------|
| Lane Configurations     | ↔     |       |      | ↔     |       |      | ↔     |       |      | ↔     |       |      |      |
| Traffic Volume (vph)    | 15    | 25    | 350  | 35    | 15    | 5    | 275   | 130   | 40   | 2     | 45    | 5    |      |
| Future Volume (vph)     | 15    | 25    | 350  | 35    | 15    | 5    | 275   | 130   | 40   | 2     | 45    | 5    |      |
| Ideal Flow (vphpl)      | 1900  | 1900  | 1900 | 1900  | 1900  | 1900 | 1900  | 1900  | 1900 | 1900  | 1900  | 1900 |      |
| Satd. Flow (prot)       | 0     | 1667  | 0    | 0     | 1818  | 0    | 0     | 1798  | 0    | 0     | 1832  | 0    |      |
| Flt Permitted           |       | 0.987 |      |       | 0.351 |      |       | 0.778 |      |       | 0.988 |      |      |
| Satd. Flow (perm)       | 0     | 1648  | 0    | 0     | 658   | 0    | 0     | 1434  | 0    | 0     | 1813  | 0    |      |
| Right Turn on Red       | Yes   |       |      | Yes   |       |      | Yes   |       |      | Yes   |       |      |      |
| Satd. Flow (RTOR)       | 380   |       |      | 5     |       |      | 5     |       |      | 5     |       |      |      |
| Link Speed (mph)        | 30    |       |      | 30    |       |      | 30    |       |      | 30    |       |      |      |
| Link Distance (ft)      | 2055  |       |      | 492   |       |      | 226   |       |      | 762   |       |      |      |
| Travel Time (s)         | 46.7  |       |      | 11.2  |       |      | 5.1   |       |      | 17.3  |       |      |      |
| Confl. Peds. (#/hr)     | 1     |       |      |       |       | 1    | 6     |       | 6    | 6     |       | 6    |      |
| Confl. Bikes (#/hr)     |       |       |      |       |       |      |       |       |      |       |       | 1    |      |
| Peak Hour Factor        | 0.92  | 0.92  | 0.92 | 0.92  | 0.92  | 0.92 | 0.92  | 0.92  | 0.92 | 0.92  | 0.92  | 0.92 |      |
| Heavy Vehicles (%)      | 0%    | 0%    | 0%   | 0%    | 0%    | 0%   | 1%    | 1%    | 1%   | 2%    | 2%    | 2%   |      |
| Shared Lane Traffic (%) |       |       |      |       |       |      |       |       |      |       |       |      |      |
| Lane Group Flow (vph)   | 0     | 423   | 0    | 0     | 59    | 0    | 0     | 483   | 0    | 0     | 56    | 0    |      |
| Turn Type               | Perm  | NA    |      | Perm  | NA    |      | Perm  | NA    |      | Perm  | NA    |      |      |
| Protected Phases        | 1     |       |      | 1     |       |      | 2     |       |      | 2     |       |      | 3    |
| Permitted Phases        | 1     |       |      | 1     |       |      | 2     |       |      | 2     |       |      |      |
| Detector Phase          | 1     | 1     |      | 1     | 1     |      | 2     | 2     |      | 2     | 2     |      |      |
| Switch Phase            |       |       |      |       |       |      |       |       |      |       |       |      |      |
| Minimum Initial (s)     | 8.0   | 8.0   |      | 8.0   | 8.0   |      | 8.0   | 8.0   |      | 8.0   | 8.0   |      | 8.0  |
| Minimum Split (s)       | 13.0  | 13.0  |      | 13.0  | 13.0  |      | 14.0  | 14.0  |      | 14.0  | 14.0  |      | 18.0 |
| Total Split (s)         | 35.0  | 35.0  |      | 35.0  | 35.0  |      | 36.0  | 36.0  |      | 36.0  | 36.0  |      | 25.0 |
| Total Split (%)         | 36.5% | 36.5% |      | 36.5% | 36.5% |      | 37.5% | 37.5% |      | 37.5% | 37.5% |      | 26%  |
| Yellow Time (s)         | 4.0   | 4.0   |      | 4.0   | 4.0   |      | 4.0   | 4.0   |      | 4.0   | 4.0   |      | 4.0  |
| All-Red Time (s)        | 1.0   | 1.0   |      | 1.0   | 1.0   |      | 2.0   | 2.0   |      | 2.0   | 2.0   |      | 1.0  |
| Lost Time Adjust (s)    | 0.0   |       |      | 0.0   |       |      | 0.0   |       |      | 0.0   |       |      |      |
| Total Lost Time (s)     | 5.0   |       |      | 5.0   |       |      | 6.0   |       |      | 6.0   |       |      |      |
| Lead/Lag                | Lead  | Lead  |      | Lead  | Lead  |      | Lag   | Lag   |      | Lag   | Lag   |      |      |
| Lead-Lag Optimize?      |       |       |      |       |       |      |       |       |      |       |       |      |      |
| Recall Mode             | Min   | Min   |      | Min   | Min   |      | Min   | Min   |      | Min   | Min   |      | None |
| Act Effct Green (s)     | 11.5  |       |      | 11.5  |       |      | 31.1  |       |      | 31.1  |       |      |      |
| Actuated g/C Ratio      | 0.20  |       |      | 0.20  |       |      | 0.55  |       |      | 0.55  |       |      |      |
| v/c Ratio               | 0.66  |       |      | 0.43  |       |      | 0.61  |       |      | 0.06  |       |      |      |
| Control Delay           | 9.7   |       |      | 29.9  |       |      | 17.2  |       |      | 9.4   |       |      |      |
| Queue Delay             | 0.0   |       |      | 0.0   |       |      | 0.0   |       |      | 0.0   |       |      |      |
| Total Delay             | 9.7   |       |      | 29.9  |       |      | 17.2  |       |      | 9.4   |       |      |      |
| LOS                     | A     |       |      | C     |       |      | B     |       |      | A     |       |      |      |
| Approach Delay          | 9.7   |       |      | 29.9  |       |      | 17.2  |       |      | 9.4   |       |      |      |
| Approach LOS            | A     |       |      | C     |       |      | B     |       |      | A     |       |      |      |
| Queue Length 50th (ft)  | 11    |       |      | 14    |       |      | 73    |       |      | 5     |       |      |      |
| Queue Length 95th (ft)  | 92    |       |      | 57    |       |      | #407  |       |      | 39    |       |      |      |
| Internal Link Dist (ft) | 1975  |       |      | 412   |       |      | 146   |       |      | 682   |       |      |      |
| Turn Bay Length (ft)    |       |       |      |       |       |      |       |       |      |       |       |      |      |
| Base Capacity (vph)     | 1078  |       |      | 364   |       |      | 791   |       |      | 999   |       |      |      |
| Starvation Cap Reductn  | 0     |       |      | 0     |       |      | 0     |       |      | 0     |       |      |      |
| Spillback Cap Reductn   | 0     |       |      | 0     |       |      | 0     |       |      | 0     |       |      |      |
| Storage Cap Reductn     | 0     |       |      | 0     |       |      | 0     |       |      | 0     |       |      |      |
| Reduced v/c Ratio       | 0.39  |       |      | 0.16  |       |      | 0.61  |       |      | 0.06  |       |      |      |

| Intersection Summary                                            |                        |  |
|-----------------------------------------------------------------|------------------------|--|
| Area Type:                                                      | Other                  |  |
| Cycle Length: 96                                                |                        |  |
| Actuated Cycle Length: 56.5                                     |                        |  |
| Natural Cycle: 65                                               |                        |  |
| Control Type: Actuated-Uncoordinated                            |                        |  |
| Maximum v/c Ratio: 0.66                                         |                        |  |
| Intersection Signal Delay: 14.4                                 | Intersection LOS: B    |  |
| Intersection Capacity Utilization 64.0%                         | ICU Level of Service B |  |
| Analysis Period (min) 15                                        |                        |  |
| # 95th percentile volume exceeds capacity, queue may be longer. |                        |  |
| Queue shown is maximum after two cycles.                        |                        |  |



12239.00 :: Needham Street  
5: Oak Street & Site Driveway

2025 No Build Conditions  
Timing Plan: Weekday Morning

| Intersection             |      |      |      |      |      |      |
|--------------------------|------|------|------|------|------|------|
| Int Delay, s/veh         | 0.6  |      |      |      |      |      |
| Movement                 | WBL  | WBR  | NBT  | NBR  | SBL  | SBT  |
| Lane Configurations      | ↔    |      | ↔    |      |      | ↔    |
| Traffic Vol, veh/h       | 15   | 5    | 440  | 110  | 25   | 405  |
| Future Vol, veh/h        | 15   | 5    | 440  | 110  | 25   | 405  |
| Conflicting Peds, #/hr   | 4    | 0    | 0    | 3    | 3    | 0    |
| Sign Control             | Stop | Stop | Free | Free | Free | Free |
| RT Channelized           | -    | None | -    | None | -    | None |
| Storage Length           | 0    | -    | -    | -    | -    | -    |
| Veh in Median Storage, # | 0    | -    | 0    | -    | -    | 0    |
| Grade, %                 | 0    | -    | 0    | -    | -    | 0    |
| Peak Hour Factor         | 92   | 92   | 92   | 92   | 92   | 92   |
| Heavy Vehicles, %        | 0    | 0    | 1    | 1    | 1    | 1    |
| Mvmt Flow                | 16   | 5    | 478  | 120  | 27   | 440  |

| Major/Minor          | Minor1 | Major1 | Major2 |       |
|----------------------|--------|--------|--------|-------|
| Conflicting Flow All | 1040   | 541    | 0      | 601   |
| Stage 1              | 541    | -      | -      | -     |
| Stage 2              | 499    | -      | -      | -     |
| Critical Hdwy        | 6.4    | 6.2    | -      | 4.11  |
| Critical Hdwy Stg 1  | 5.4    | -      | -      | -     |
| Critical Hdwy Stg 2  | 5.4    | -      | -      | -     |
| Follow-up Hdwy       | 3.5    | 3.3    | -      | 2.209 |
| Pot Cap-1 Maneuver   | 257    | 545    | -      | 981   |
| Stage 1              | 588    | -      | -      | -     |
| Stage 2              | 614    | -      | -      | -     |
| Platoon blocked, %   |        | -      | -      | -     |
| Mov Cap-1 Maneuver   | 246    | 544    | -      | 981   |
| Mov Cap-2 Maneuver   | 246    | -      | -      | -     |
| Stage 1              | 587    | -      | -      | -     |
| Stage 2              | 590    | -      | -      | -     |

| Approach             | WB   | NB | SB  |
|----------------------|------|----|-----|
| HCM Control Delay, s | 18.7 | 0  | 0.5 |
| HCM LOS              | C    |    |     |

| Minor Lane/Major Mvmt | NBT | NBR | WBLn1 | SBL   | SBT |
|-----------------------|-----|-----|-------|-------|-----|
| Capacity (veh/h)      | -   | -   | 285   | 981   | -   |
| HCM Lane V/C Ratio    | -   | -   | 0.076 | 0.028 | -   |
| HCM Control Delay (s) | -   | -   | 18.7  | 8.8   | 0   |
| HCM Lane LOS          | -   | -   | C     | A     | A   |
| HCM 95th %ile Q(veh)  | -   | -   | 0.2   | 0.1   | -   |



2025 No Build Conditions  
Timing Plan: Weekday Morning

| Intersection Summary              |                                                               |
|-----------------------------------|---------------------------------------------------------------|
| Area Type:                        | Other                                                         |
| Cycle Length:                     | 129                                                           |
| Actuated Cycle Length:            | 121                                                           |
| Natural Cycle:                    | 150                                                           |
| Control Type:                     | Actuated-Uncoordinated                                        |
| Maximum v/c Ratio:                | 1.33                                                          |
| Intersection Signal Delay:        | 59.7                                                          |
| Intersection Capacity Utilization | 103.0%                                                        |
| Analysis Period (min)             | 15                                                            |
| ~                                 | Volume exceeds capacity, queue is theoretically infinite.     |
|                                   | Queue shown is maximum after two cycles.                      |
| #                                 | 95th percentile volume exceeds capacity, queue may be longer. |
|                                   | Queue shown is maximum after two cycles.                      |

2025 No Build Conditions  
Timing Plan: Weekday Morning

12239.00 :: Needham Street  
7: Needham Street & South Site Driveway

2025 No Build Conditions  
Timing Plan: Weekday Morning

| Intersection             |        |       |        |      |      |      |
|--------------------------|--------|-------|--------|------|------|------|
| Int Delay, s/veh         | 0.1    |       |        |      |      |      |
| Movement                 | EBL    | EBR   | NBL    | NBT  | SBT  | SBR  |
| Lane Configurations      | ↵      |       |        | ↵    | ↵    |      |
| Traffic Vol, veh/h       | 1      | 1     | 5      | 920  | 830  | 5    |
| Future Vol, veh/h        | 1      | 1     | 5      | 920  | 830  | 5    |
| Conflicting Peds, #/hr   | 0      | 0     | 2      | 0    | 0    | 2    |
| Sign Control             | Stop   | Stop  | Free   | Free | Free | Free |
| RT Channelized           | -      | None  | -      | None | -    | None |
| Storage Length           | 0      | -     | -      | -    | -    | -    |
| Veh in Median Storage, # | 0      | -     | -      | 0    | 0    | -    |
| Grade, %                 | 0      | -     | -      | 0    | 0    | -    |
| Peak Hour Factor         | 92     | 92    | 92     | 92   | 92   | 92   |
| Heavy Vehicles, %        | 0      | 0     | 1      | 1    | 2    | 2    |
| Mvmt Flow                | 1      | 1     | 5      | 1000 | 902  | 5    |
| Major/Minor              |        |       |        |      |      |      |
| Minor2                   | Major1 |       | Major2 |      |      |      |
| Conflicting Flow All     | 1918   | 907   | 910    | 0    | -    | 0    |
| Stage 1                  | 907    | -     | -      | -    | -    | -    |
| Stage 2                  | 1011   | -     | -      | -    | -    | -    |
| Critical Hdwy            | 6.4    | 6.2   | 4.11   | -    | -    | -    |
| Critical Hdwy Stg 1      | 5.4    | -     | -      | -    | -    | -    |
| Critical Hdwy Stg 2      | 5.4    | -     | -      | -    | -    | -    |
| Follow-up Hdwy           | 3.5    | 3.3   | 2.209  | -    | -    | -    |
| Pot Cap-1 Maneuver       | 75     | 337   | 753    | -    | -    | -    |
| Stage 1                  | 397    | -     | -      | -    | -    | -    |
| Stage 2                  | 355    | -     | -      | -    | -    | -    |
| Platoon blocked, %       |        |       |        | -    | -    | -    |
| Mov Cap-1 Maneuver       | 74     | 336   | 753    | -    | -    | -    |
| Mov Cap-2 Maneuver       | 74     | -     | -      | -    | -    | -    |
| Stage 1                  | 396    | -     | -      | -    | -    | -    |
| Stage 2                  | 349    | -     | -      | -    | -    | -    |
| Approach                 |        |       |        |      |      |      |
| EB                       | NB     |       | SB     |      |      |      |
| HCM Control Delay, s     | 35.3   | 0.1   |        | 0    |      |      |
| HCM LOS                  | E      |       |        |      |      |      |
| Minor Lane/Major Mvmt    |        |       |        |      |      |      |
| NBL                      | NBT    | EBLn1 | SBT    | SBR  |      |      |
| Capacity (veh/h)         | 753    | -     | 121    | -    | -    | -    |
| HCM Lane V/C Ratio       | 0.007  | -     | 0.018  | -    | -    | -    |
| HCM Control Delay (s)    | 9.8    | 0     | 35.3   | -    | -    | -    |
| HCM Lane LOS             | A      | A     | E      | -    | -    | -    |
| HCM 95th %ile Q(veh)     | 0      | -     | 0.1    | -    | -    | -    |

12239.00 :: Needham Street  
8: Needham Street & Middle Site Driveway/TJMaxx Driveway

2025 No Build Conditions  
Timing Plan: Weekday Morning

| Intersection             |        |       |       |        |       |       |      |      |       |      |      |      |
|--------------------------|--------|-------|-------|--------|-------|-------|------|------|-------|------|------|------|
| Int Delay, s/veh         | 0.5    |       |       |        |       |       |      |      |       |      |      |      |
| Movement                 | EBL    | EBT   | EBR   | WBL    | WBT   | WBR   | NBL  | NBT  | NBR   | SBL  | SBT  | SBR  |
| Lane Configurations      |        | ↵     |       |        |       |       | ↵    | ↵    |       | ↵    | ↵    |      |
| Traffic Vol, veh/h       | 5      | 0     | 20    | 0      | 0     | 0     | 15   | 850  | 2     | 5    | 815  | 0    |
| Future Vol, veh/h        | 5      | 0     | 20    | 0      | 0     | 0     | 15   | 850  | 2     | 5    | 815  | 0    |
| Conflicting Peds, #/hr   | 0      | 0     | 0     | 0      | 0     | 0     | 2    | 0    | 8     | 8    | 0    | 2    |
| Sign Control             | Stop   | Stop  | Stop  | Stop   | Stop  | Stop  | Free | Free | Free  | Free | Free | Free |
| RT Channelized           | -      | -     | None  | -      | -     | None  | -    | -    | None  | -    | -    | None |
| Storage Length           | -      | -     | -     | -      | -     | -     | 120  | -    | -     | 80   | -    | -    |
| Veh in Median Storage, # | -      | 0     | -     | -      | -     | -     | 0    | -    | -     | 0    | -    | -    |
| Grade, %                 | -      | 0     | -     | -      | 0     | -     | -    | 0    | -     | -    | 0    | -    |
| Peak Hour Factor         | 92     | 92    | 92    | 92     | 92    | 92    | 92   | 92   | 92    | 92   | 92   | 92   |
| Heavy Vehicles, %        | 4      | 4     | 4     | 0      | 0     | 0     | 1    | 1    | 1     | 2    | 2    | 2    |
| Mvmt Flow                | 5      | 0     | 22    | 0      | 0     | 0     | 16   | 924  | 2     | 5    | 886  | 0    |
| Major/Minor              |        |       |       |        |       |       |      |      |       |      |      |      |
| Minor2                   | Major1 |       |       | Major2 |       |       |      |      |       |      |      |      |
| Conflicting Flow All     | 1857   | 1866  | 888   |        | 888   | 0     | 0    | 934  | 0     | 0    |      |      |
| Stage 1                  | 899    | 899   | -     |        | -     | -     | -    | -    | -     | -    | -    | -    |
| Stage 2                  | 958    | 967   | -     |        | -     | -     | -    | -    | -     | -    | -    | -    |
| Critical Hdwy            | 6.44   | 6.54  | 6.24  |        |       | 4.11  | -    | -    | 4.12  | -    | -    | -    |
| Critical Hdwy Stg 1      | 5.44   | 5.54  | -     |        |       | -     | -    | -    | -     | -    | -    | -    |
| Critical Hdwy Stg 2      | 5.44   | 5.54  | -     |        |       | -     | -    | -    | -     | -    | -    | -    |
| Follow-up Hdwy           | 3.536  | 4.036 | 3.336 |        |       | 2.209 | -    | -    | 2.218 | -    | -    | -    |
| Pot Cap-1 Maneuver       | 80     | 72    | 340   |        |       | 767   | -    | -    | 733   | -    | -    | -    |
| Stage 1                  | 394    | 355   | -     |        |       | -     | -    | -    | -     | -    | -    | -    |
| Stage 2                  | 369    | 330   | -     |        |       | -     | -    | -    | -     | -    | -    | -    |
| Platoon blocked, %       |        |       |       |        |       | -     | -    | -    | -     | -    | -    | -    |
| Mov Cap-1 Maneuver       | 78     | 0     | 339   |        |       | 767   | -    | -    | 733   | -    | -    | -    |
| Mov Cap-2 Maneuver       | 78     | 0     | -     |        |       | -     | -    | -    | -     | -    | -    | -    |
| Stage 1                  | 391    | 0     | -     |        |       | -     | -    | -    | -     | -    | -    | -    |
| Stage 2                  | 361    | 0     | -     |        |       | -     | -    | -    | -     | -    | -    | -    |
| Approach                 |        |       |       |        |       |       |      |      |       |      |      |      |
| EB                       | NB     |       |       | SB     |       |       |      |      |       |      |      |      |
| HCM Control Delay, s     | 25.5   |       |       |        | 0.2   |       |      |      |       | 0.1  |      |      |
| HCM LOS                  | D      |       |       |        |       |       |      |      |       |      |      |      |
| Minor Lane/Major Mvmt    |        |       |       |        |       |       |      |      |       |      |      |      |
| NBL                      | NBT    | NBR   | EBLn1 | SBL    | SBT   | SBR   |      |      |       |      |      |      |
| Capacity (veh/h)         | 767    | -     | -     | 203    | 733   | -     | -    | -    | -     | -    | -    | -    |
| HCM Lane V/C Ratio       | 0.021  | -     | -     | 0.134  | 0.007 | -     | -    | -    | -     | -    | -    | -    |
| HCM Control Delay (s)    | 9.8    | -     | -     | 25.5   | 9.9   | -     | -    | -    | -     | -    | -    | -    |
| HCM Lane LOS             | A      | -     | -     | D      | A     | -     | -    | -    | -     | -    | -    | -    |
| HCM 95th %ile Q(veh)     | 0.1    | -     | -     | 0.5    | 0     | -     | -    | -    | -     | -    | -    | -    |

2025 No Build Conditions  
Timing Plan: Weekday Morning

| Intersection Summary               |                                                               |
|------------------------------------|---------------------------------------------------------------|
| Area Type:                         | Other                                                         |
| Cycle Length:                      | 104                                                           |
| Actuated Cycle Length:             | 64.9                                                          |
| Natural Cycle:                     | 90                                                            |
| Control Type:                      | Actuated-Uncoordinated                                        |
| Maximum v/c Ratio:                 | 0.59                                                          |
| Intersection Signal Delay:         | 11.3                                                          |
| Intersection Capacity Utilization: | 62.9%                                                         |
| Analysis Period (min):             | 15                                                            |
| #                                  | 95th percentile volume exceeds capacity, queue may be longer. |
|                                    | Queue shown is maximum after two cycles.                      |

[illegible]

2025 No Build Conditions  
Timing Plan: Weekday Morning

| Approach             | EB   | WB   | NB  | SB  |
|----------------------|------|------|-----|-----|
| HCM Control Delay, s | 36.4 | 43.3 | 0.2 | 0.1 |
| HCM LOS              | E    | E    |     |     |

HCM 2010 TWSC  
VHB/MSD

12239.00 :: Needham Street  
11: Needham Street & Jaconnet Street

2025 No Build Conditions  
Timing Plan: Weekday Morning

| Intersection             |        |      |        |       |       |      |
|--------------------------|--------|------|--------|-------|-------|------|
| Int Delay, s/veh         | 0.2    |      |        |       |       |      |
| Movement                 | WBL    | WBR  | NBT    | NBR   | SBL   | SBT  |
| Lane Configurations      | ↵      |      | ↵      |       | ↵     | ↵    |
| Traffic Vol, veh/h       | 5      | 10   | 765    | 20    | 2     | 885  |
| Future Vol, veh/h        | 5      | 10   | 765    | 20    | 2     | 885  |
| Conflicting Peds, #/hr   | 0      | 1    | 0      | 17    | 17    | 0    |
| Sign Control             | Stop   | Stop | Free   | Free  | Free  | Free |
| RT Channelized           | -      | None | -      | None  | -     | None |
| Storage Length           | 0      | -    | -      | -     | 100   | -    |
| Veh in Median Storage, # | 0      | -    | 0      | -     | -     | 0    |
| Grade, %                 | 0      | -    | 0      | -     | -     | 0    |
| Peak Hour Factor         | 92     | 92   | 92     | 92    | 92    | 92   |
| Heavy Vehicles, %        | 0      | 0    | 2      | 2     | 2     | 2    |
| Mvmt Flow                | 5      | 11   | 832    | 22    | 2     | 962  |
| Major/Minor              |        |      |        |       |       |      |
| Minor1                   | Major1 |      | Major2 |       |       |      |
| Conflicting Flow All     | 1825   | 860  | 0      | 0     | 870   | 0    |
| Stage 1                  | 859    | -    | -      | -     | -     | -    |
| Stage 2                  | 966    | -    | -      | -     | -     | -    |
| Critical Hdwy            | 6.4    | 6.2  | -      | -     | 4.12  | -    |
| Critical Hdwy Stg 1      | 5.4    | -    | -      | -     | -     | -    |
| Critical Hdwy Stg 2      | 5.4    | -    | -      | -     | -     | -    |
| Follow-up Hdwy           | 3.5    | 3.3  | -      | -     | 2.218 | -    |
| Pot Cap-1 Maneuver       | 86     | 359  | -      | -     | 775   | -    |
| Stage 1                  | 418    | -    | -      | -     | -     | -    |
| Stage 2                  | 372    | -    | -      | -     | -     | -    |
| Platoon blocked, %       |        |      | -      | -     | -     | -    |
| Mov Cap-1 Maneuver       | 85     | 354  | -      | -     | 774   | -    |
| Mov Cap-2 Maneuver       | 85     | -    | -      | -     | -     | -    |
| Stage 1                  | 412    | -    | -      | -     | -     | -    |
| Stage 2                  | 371    | -    | -      | -     | -     | -    |
| Approach                 |        |      |        |       |       |      |
| WB                       | NB     |      | SB     |       |       |      |
| HCM Control Delay, s     | 28.1   | 0    |        | 0     |       |      |
| HCM LOS                  | D      |      |        |       |       |      |
| Minor Lane/Major Mvmt    |        |      |        |       |       |      |
|                          | NBT    | NBR  | WBLn1  | SBL   | SBT   |      |
| Capacity (veh/h)         | -      | -    | 172    | 774   | -     |      |
| HCM Lane V/C Ratio       | -      | -    | 0.095  | 0.003 | -     |      |
| HCM Control Delay (s)    | -      | -    | 28.1   | 9.7   | -     |      |
| HCM Lane LOS             | -      | -    | D      | A     | -     |      |
| HCM 95th %tile Q(veh)    | -      | -    | 0.3    | 0     | -     |      |

12239.00 :: Needham Street  
12: Needham Street & Rockland Street

2025 No Build Conditions  
Timing Plan: Weekday Morning

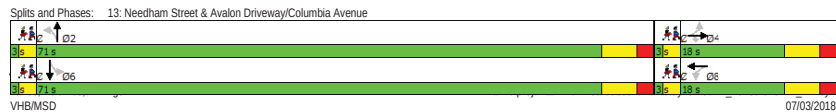
| Intersection             |        |        |       |        |       |      |
|--------------------------|--------|--------|-------|--------|-------|------|
| Int Delay, s/veh         | 0.3    |        |       |        |       |      |
| Movement                 | WBL    | WBR    | NBT   | NBR    | SBL   | SBT  |
| Lane Configurations      | ↵      |        | ↵     |        | ↵     | ↵    |
| Traffic Vol, veh/h       | 5      | 5      | 720   | 5      | 10    | 930  |
| Future Vol, veh/h        | 5      | 5      | 720   | 5      | 10    | 930  |
| Conflicting Peds, #/hr   | 1      | 0      | 0     | 9      | 9     | 0    |
| Sign Control             | Stop   | Stop   | Free  | Free   | Free  | Free |
| RT Channelized           | -      | None   | -     | None   | -     | None |
| Storage Length           | 0      | -      | -     | -      | 125   | -    |
| Veh in Median Storage, # | 0      | -      | 0     | -      | -     | 0    |
| Grade, %                 | 0      | -      | 0     | -      | -     | 0    |
| Peak Hour Factor         | 92     | 92     | 92    | 92     | 92    | 92   |
| Heavy Vehicles, %        | 0      | 0      | 2     | 2      | 2     | 2    |
| Mvmt Flow                | 5      | 5      | 783   | 5      | 11    | 1011 |
| Major/Minor              |        |        |       |        |       |      |
|                          | Minor1 | Major1 |       | Major2 |       |      |
| Conflicting Flow All     | 1828   | 794    | 0     | 0      | 797   | 0    |
| Stage 1                  | 794    | -      | -     | -      | -     | -    |
| Stage 2                  | 1034   | -      | -     | -      | -     | -    |
| Critical Hdwy            | 6.4    | 6.2    | -     | -      | 4.12  | -    |
| Critical Hdwy Stg 1      | 5.4    | -      | -     | -      | -     | -    |
| Critical Hdwy Stg 2      | 5.4    | -      | -     | -      | -     | -    |
| Follow-up Hdwy           | 3.5    | 3.3    | -     | -      | 2.218 | -    |
| Pot Cap-1 Maneuver       | 85     | 391    | -     | -      | 825   | -    |
| Stage 1                  | 449    | -      | -     | -      | -     | -    |
| Stage 2                  | 346    | -      | -     | -      | -     | -    |
| Platoon blocked, %       |        |        | -     | -      | -     | -    |
| Mov Cap-1 Maneuver       | 83     | 388    | -     | -      | 825   | -    |
| Mov Cap-2 Maneuver       | 83     | -      | -     | -      | -     | -    |
| Stage 1                  | 446    | -      | -     | -      | -     | -    |
| Stage 2                  | 341    | -      | -     | -      | -     | -    |
| Approach                 |        |        |       |        |       |      |
|                          | WB     | NB     |       | SB     |       |      |
| HCM Control Delay, s     | 33.5   | 0      |       | 0.1    |       |      |
| HCM LOS                  | D      |        |       |        |       |      |
| Minor Lane/Major Mvmt    |        |        |       |        |       |      |
|                          | NBT    | NBR    | WBLn1 | SBL    | SBT   |      |
| Capacity (veh/h)         | -      | -      | 137   | 825    | -     |      |
| HCM Lane V/C Ratio       | -      | -      | 0.079 | 0.013  | -     |      |
| HCM Control Delay (s)    | -      | -      | 33.5  | 9.4    | -     |      |
| HCM Lane LOS             | -      | -      | D     | A      | -     |      |
| HCM 95th %ile Q(veh)     | -      | -      | 0.3   | 0      | -     |      |

12239.00 :: Needham Street  
13: Needham Street & Avalon Driveway/Columbia Avenue

2025 No Build Conditions  
Timing Plan: Weekday Morning

| Lane Group              | EBL   | EBT   | EBR   | WBL   | WBT   | WBR  | NBL   | NBT   | NBR  | SBL   | SBT   | SBR  | Ø1   | Ø3   | Ø5   | Ø7   |
|-------------------------|-------|-------|-------|-------|-------|------|-------|-------|------|-------|-------|------|------|------|------|------|
| Lane Configurations     |       |       |       |       |       |      |       |       |      |       |       |      |      |      |      |      |
| Traffic Volume (vph)    | 25    | 0     | 25    | 15    | 5     | 15   | 15    | 710   | 1    | 1     | 925   | 15   |      |      |      |      |
| Future Volume (vph)     | 25    | 0     | 25    | 15    | 5     | 15   | 15    | 710   | 1    | 1     | 925   | 15   |      |      |      |      |
| Ideal Flow (vphpl)      | 1900  | 1900  | 1900  | 1900  | 1900  | 1900 | 1900  | 1900  | 1900 | 1900  | 1900  | 1900 |      |      |      |      |
| Storage Length (ft)     | 0     |       | 50    | 0     |       | 0    | 125   | 0     |      | 0     | 100   | 0    |      |      |      |      |
| Storage Lanes           | 0     |       | 1     | 0     |       | 0    | 1     | 0     |      | 0     | 1     | 0    |      |      |      |      |
| Taper Length (ft)       | 25    |       |       | 25    |       |      | 25    |       |      | 25    |       |      |      |      |      |      |
| Satd. Flow (prot)       | 0     | 1736  | 1553  | 0     | 1713  | 0    | 1752  | 1845  | 0    | 1770  | 1858  | 0    |      |      |      |      |
| Flt Permitted           |       |       |       |       | 0.848 |      | 0.166 |       |      | 0.307 |       |      |      |      |      |      |
| Satd. Flow (perm)       | 0     | 1770  | 1511  | 0     | 1479  | 0    | 306   | 1845  | 0    | 572   | 1858  | 0    |      |      |      |      |
| Right Turn on Red       |       | Yes   |       |       | Yes   |      |       | Yes   |      |       | Yes   |      |      |      |      |      |
| Satd. Flow (RTOR)       |       | 80    |       |       | 16    |      |       |       |      | 2     |       |      |      |      |      |      |
| Link Speed (mph)        |       | 30    |       |       | 30    |      |       | 30    |      | 30    |       |      |      |      |      |      |
| Link Distance (ft)      |       | 190   |       |       | 435   |      |       | 338   |      | 1135  |       |      |      |      |      |      |
| Travel Time (s)         |       | 4.3   |       |       | 9.9   |      |       | 7.7   |      | 25.8  |       |      |      |      |      |      |
| Confl. Peds. (#/hr)     | 11    |       | 2     | 2     |       | 11   | 8     |       | 5    | 5     |       | 8    |      |      |      |      |
| Confl. Bikes (#/hr)     |       |       |       |       |       |      |       | 1     |      |       |       |      |      |      |      |      |
| Peak Hour Factor        | 0.92  | 0.92  | 0.92  | 0.92  | 0.92  | 0.92 | 0.92  | 0.92  | 0.92 | 0.92  | 0.92  | 0.92 |      |      |      |      |
| Heavy Vehicles (%)      | 4%    | 4%    | 4%    | 0%    | 0%    | 0%   | 3%    | 3%    | 3%   | 2%    | 2%    | 2%   |      |      |      |      |
| Shared Lane Traffic (%) |       |       |       |       |       |      |       |       |      |       |       |      |      |      |      |      |
| Lane Group Flow (vph)   | 0     | 27    | 27    | 0     | 37    | 0    | 16    | 773   | 0    | 1     | 1021  | 0    |      |      |      |      |
| Turn Type               | Perm  | NA    | Perm  | Perm  | NA    | Perm | NA    | Perm  | NA   | Perm  | NA    | Perm |      |      |      |      |
| Protected Phases        |       | 4     |       |       | 8     |      |       | 2     |      | 6     |       |      | 1    | 3    | 5    | 7    |
| Permitted Phases        | 4     |       | 4     | 8     |       | 2    |       | 6     |      |       |       |      |      |      |      |      |
| Detector Phase          | 4     | 4     | 4     | 8     | 8     |      | 2     | 2     |      | 6     | 6     |      |      |      |      |      |
| Switch Phase            |       |       |       |       |       |      |       |       |      |       |       |      |      |      |      |      |
| Minimum Initial (s)     | 4.0   | 4.0   | 4.0   | 4.0   | 4.0   |      | 10.0  | 10.0  |      | 10.0  | 10.0  |      | 1.0  | 1.0  | 1.0  | 1.0  |
| Minimum Split (s)       | 19.0  | 19.0  | 19.0  | 22.0  | 22.0  |      | 16.0  | 16.0  |      | 20.0  | 20.0  |      | 3.0  | 3.0  | 3.0  | 3.0  |
| Total Split (s)         | 18.0  | 18.0  | 18.0  | 18.0  | 18.0  |      | 71.0  | 71.0  |      | 71.0  | 71.0  |      | 3.0  | 3.0  | 3.0  | 3.0  |
| Total Split (%)         | 18.9% | 18.9% | 18.9% | 18.9% | 18.9% |      | 74.7% | 74.7% |      | 74.7% | 74.7% |      | 3%   | 3%   | 3%   | 3%   |
| Yellow Time (s)         | 4.0   | 4.0   | 4.0   | 4.0   | 4.0   |      | 4.0   | 4.0   |      | 4.0   | 4.0   |      | 2.0  | 2.0  | 2.0  | 2.0  |
| All-Red Time (s)        | 2.0   | 2.0   | 2.0   | 2.0   | 2.0   |      | 2.0   | 2.0   |      | 2.0   | 2.0   |      | 0.0  | 0.0  | 0.0  | 0.0  |
| Lost Time Adjust (s)    | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   |      | 0.0   | 0.0   |      | 0.0   | 0.0   |      |      |      |      |      |
| Total Lost Time (s)     | 6.0   | 6.0   | 6.0   | 6.0   | 6.0   |      | 6.0   | 6.0   |      | 6.0   | 6.0   |      |      |      |      |      |
| Lead/Lag                | Lag   | Lag   | Lag   | Lag   | Lag   |      | Lag   | Lag   |      | Lag   | Lag   |      | Lead | Lead | Lead | Lead |
| Lead-Lag Optimize?      |       |       |       |       |       |      |       |       |      |       |       |      |      |      |      |      |
| Recall Mode             | None  | None  | None  | None  | None  |      | None  | None  |      | None  | None  |      | None | None | None | None |
| Act Effect Green (s)    | 8.6   | 8.6   | 8.6   | 8.5   | 8.5   |      | 40.0  | 40.0  |      | 40.0  | 40.0  |      |      |      |      |      |
| Actuated g/C Ratio      | 0.17  | 0.17  | 0.17  | 0.17  | 0.17  |      | 0.80  | 0.80  |      | 0.80  | 0.80  |      |      |      |      |      |
| v/c Ratio               | 0.09  | 0.08  | 0.08  | 0.14  | 0.07  | 0.52 | 0.00  | 0.69  |      | 0.00  | 0.69  |      |      |      |      |      |
| Control Delay           | 29.6  | 0.5   | 22.4  |       | 5.6   | 7.1  | 5.0   | 10.6  |      | 5.0   | 10.6  |      |      |      |      |      |
| Queue Delay             | 0.0   | 0.0   | 0.0   |       | 0.0   | 0.0  | 0.0   | 0.0   |      | 0.0   | 0.0   |      |      |      |      |      |
| Total Delay             | 29.6  | 0.5   | 22.4  |       | 5.6   | 7.1  | 5.0   | 10.6  |      | 5.0   | 10.6  |      |      |      |      |      |
| LOS                     | C     | A     | C     |       | A     | A    | A     | B     |      | A     | B     |      |      |      |      |      |
| Approach Delay          | 15.1  |       | 22.4  |       | 7.1   |      | 10.6  |       |      |       |       |      |      |      |      |      |
| Approach LOS            | B     |       | C     |       | A     |      | B     |       |      |       |       |      |      |      |      |      |
| Queue Length 50th (ft)  | 7     | 0     | 6     |       | 1     | 110  | 0     | 186   |      | 0     | 186   |      |      |      |      |      |
| Queue Length 95th (ft)  | 40    | 0     | 40    |       | 12    | 377  | 2     | 664   |      | 2     | 664   |      |      |      |      |      |
| Internal Link Dist (ft) | 110   |       | 355   |       | 258   |      | 1055  |       |      |       |       |      |      |      |      |      |
| Turn Bay Length (ft)    |       | 50    |       |       | 125   |      | 100   |       |      |       |       |      |      |      |      |      |
| Base Capacity (vph)     | 639   | 596   |       | 544   | 285   | 1718 | 533   | 1730  |      |       |       |      |      |      |      |      |
| Starvation Cap Reductn  | 0     | 0     | 0     |       | 0     | 0    | 0     | 0     |      | 0     | 0     |      |      |      |      |      |
| Spillback Cap Reductn   | 0     | 0     | 0     |       | 0     | 0    | 0     | 0     |      | 0     | 0     |      |      |      |      |      |
| Storage Cap Reductn     | 0     | 0     | 0     |       | 0     | 0    | 0     | 0     |      | 0     | 0     |      |      |      |      |      |
| Reduced v/c Ratio       | 0.04  | 0.05  |       | 0.07  | 0.06  | 0.45 | 0.00  | 0.59  |      |       |       |      |      |      |      |      |

| Intersection Summary              |                        |                        |
|-----------------------------------|------------------------|------------------------|
| Area Type:                        | Other                  |                        |
| Cycle Length:                     | 95                     |                        |
| Actuated Cycle Length:            | 50.1                   |                        |
| Natural Cycle:                    | 80                     |                        |
| Control Type:                     | Actuated-Uncoordinated |                        |
| Maximum v/c Ratio:                | 0.69                   |                        |
| Intersection Signal Delay:        | 9.5                    | Intersection LOS: A    |
| Intersection Capacity Utilization | 74.8%                  | ICU Level of Service D |
| Analysis Period (min)             | 15                     |                        |



VHB/MSD 07/03/2018

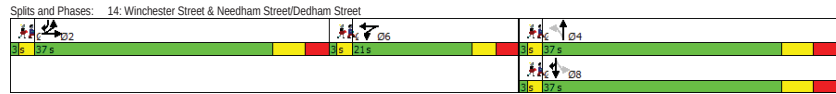
12239.00 :: Needham Street  
14: Winchester Street & Needham Street/Dedham Street

2025 No Build Conditions  
Timing Plan: Weekday Morning

|                         |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|-------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
| Lane Group              | EBL                                                                                 | EBT                                                                                 | EBR                                                                                 | WBL                                                                                 | WBT                                                                                 | WBR                                                                                 | NBL                                                                                 | NBT                                                                                 | NBR                                                                                 | SBL                                                                                 | SBT                                                                                 | SBR                                                                                 | Ø1                                                                                  | Ø3                                                                                  | Ø5                                                                                  | Ø7                                                                                  |                                                                                     |                                                                                     |
| Lane Configurations     |  |  |                                                                                     |                                                                                     |  |                                                                                     |  |                                                                                     |                                                                                     |                                                                                     |  |  |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Traffic Volume (vph)    | 700                                                                                 | 95                                                                                  | 40                                                                                  | 15                                                                                  | 125                                                                                 | 155                                                                                 | 30                                                                                  | 290                                                                                 | 5                                                                                   | 50                                                                                  | 345                                                                                 | 805                                                                                 |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Future Volume (vph)     | 700                                                                                 | 95                                                                                  | 40                                                                                  | 15                                                                                  | 125                                                                                 | 155                                                                                 | 30                                                                                  | 290                                                                                 | 5                                                                                   | 50                                                                                  | 345                                                                                 | 805                                                                                 |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Ideal Flow (vphpl)      | 1900                                                                                | 1900                                                                                | 1900                                                                                | 1900                                                                                | 1900                                                                                | 1900                                                                                | 1900                                                                                | 1900                                                                                | 1900                                                                                | 1900                                                                                | 1900                                                                                | 1900                                                                                |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Storage Length (ft)     | 340                                                                                 |                                                                                     | 75                                                                                  | 0                                                                                   |                                                                                     |                                                                                     | 0                                                                                   | 100                                                                                 |                                                                                     | 0                                                                                   | 0                                                                                   | 0                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Storage Lanes           | 1                                                                                   |                                                                                     | 1                                                                                   | 0                                                                                   |                                                                                     |                                                                                     | 0                                                                                   | 1                                                                                   |                                                                                     | 0                                                                                   | 0                                                                                   | 1                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Taper Length (ft)       | 25                                                                                  |                                                                                     |                                                                                     | 25                                                                                  |                                                                                     |                                                                                     |                                                                                     | 25                                                                                  |                                                                                     |                                                                                     | 25                                                                                  |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Satd. Flow (prot)       | 3433                                                                                | 1767                                                                                | 0                                                                                   | 0                                                                                   | 1740                                                                                | 0                                                                                   | 1770                                                                                | 1858                                                                                | 0                                                                                   | 0                                                                                   | 1870                                                                                | 1599                                                                                |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Flt Permitted           | 0.950                                                                               |                                                                                     |                                                                                     |                                                                                     | 0.998                                                                               |                                                                                     | 0.298                                                                               |                                                                                     |                                                                                     |                                                                                     | 0.815                                                                               |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Satd. Flow (perm)       | 3389                                                                                | 1767                                                                                | 0                                                                                   | 0                                                                                   | 1739                                                                                | 0                                                                                   | 555                                                                                 | 1858                                                                                | 0                                                                                   | 0                                                                                   | 1533                                                                                | 1599                                                                                |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Right Turn on Red       |                                                                                     |                                                                                     | Yes                                                                                 |                                                                                     |                                                                                     | Yes                                                                                 |                                                                                     |                                                                                     | No                                                                                  |                                                                                     | Yes                                                                                 |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Satd. Flow (RTOR)       |                                                                                     | 20                                                                                  |                                                                                     |                                                                                     | 45                                                                                  |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     | 424                                                                                 |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Link Speed (mph)        |                                                                                     | 30                                                                                  |                                                                                     |                                                                                     | 30                                                                                  |                                                                                     |                                                                                     | 30                                                                                  |                                                                                     | 30                                                                                  |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Link Distance (ft)      |                                                                                     | 1135                                                                                |                                                                                     |                                                                                     | 451                                                                                 |                                                                                     |                                                                                     | 634                                                                                 |                                                                                     | 722                                                                                 |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Travel Time (s)         |                                                                                     | 25.8                                                                                |                                                                                     |                                                                                     | 10.3                                                                                |                                                                                     |                                                                                     | 14.4                                                                                |                                                                                     | 16.4                                                                                |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Confl. Peds. (#/hr)     | 5                                                                                   |                                                                                     | 1                                                                                   | 1                                                                                   |                                                                                     | 5                                                                                   |                                                                                     |                                                                                     | 1                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Confl. Bikes (#/hr)     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Peak Hour Factor        | 0.92                                                                                | 0.92                                                                                | 0.92                                                                                | 0.92                                                                                | 0.92                                                                                | 0.92                                                                                | 0.92                                                                                | 0.92                                                                                | 0.92                                                                                | 0.92                                                                                | 0.92                                                                                | 0.92                                                                                |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Heavy Vehicles (%)      | 2%                                                                                  | 2%                                                                                  | 2%                                                                                  | 0%                                                                                  | 0%                                                                                  | 0%                                                                                  | 2%                                                                                  | 2%                                                                                  | 2%                                                                                  | 1%                                                                                  | 1%                                                                                  | 1%                                                                                  |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Shared Lane Traffic (%) |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Lane Group Flow (vph)   | 761                                                                                 | 146                                                                                 | 0                                                                                   | 0                                                                                   | 320                                                                                 | 0                                                                                   | 33                                                                                  | 320                                                                                 | 0                                                                                   | 0                                                                                   | 429                                                                                 | 875                                                                                 |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Turn Type               | Split                                                                               | NA                                                                                  |                                                                                     | Split                                                                               | NA                                                                                  |                                                                                     | Perm                                                                                | NA                                                                                  |                                                                                     | Perm                                                                                | NA                                                                                  | pt+ov                                                                               |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Protected Phases        | 2                                                                                   | 2                                                                                   |                                                                                     | 6                                                                                   | 6                                                                                   |                                                                                     | 4                                                                                   | 4                                                                                   |                                                                                     | 8                                                                                   | 8                                                                                   | 2 8                                                                                 | 1                                                                                   | 3                                                                                   | 5                                                                                   | 7                                                                                   |                                                                                     |                                                                                     |
| Permitted Phases        |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     | 4                                                                                   |                                                                                     |                                                                                     | 8                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Detector Phase          | 2                                                                                   | 2                                                                                   |                                                                                     | 6                                                                                   | 6                                                                                   |                                                                                     | 4                                                                                   | 4                                                                                   |                                                                                     | 8                                                                                   | 8                                                                                   | 2 8                                                                                 |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Switch Phase            |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Minimum Initial (s)     | 10.0                                                                                | 10.0                                                                                |                                                                                     | 6.0                                                                                 | 6.0                                                                                 |                                                                                     | 6.0                                                                                 | 6.0                                                                                 |                                                                                     | 6.0                                                                                 | 6.0                                                                                 |                                                                                     | 1.0                                                                                 | 1.0                                                                                 | 1.0                                                                                 | 1.0                                                                                 |                                                                                     |                                                                                     |
| Minimum Split (s)       | 17.0                                                                                | 17.0                                                                                |                                                                                     | 19.0                                                                                | 19.0                                                                                |                                                                                     | 20.0                                                                                | 20.0                                                                                |                                                                                     | 36.0                                                                                | 36.0                                                                                |                                                                                     | 3.0                                                                                 | 3.0                                                                                 | 3.0                                                                                 | 3.0                                                                                 |                                                                                     |                                                                                     |
| Total Split (s)         | 37.0                                                                                | 37.0                                                                                |                                                                                     | 21.0                                                                                | 21.0                                                                                |                                                                                     | 37.0                                                                                | 37.0                                                                                |                                                                                     | 37.0                                                                                | 37.0                                                                                |                                                                                     | 3.0                                                                                 | 3.0                                                                                 | 3.0                                                                                 | 3.0                                                                                 |                                                                                     |                                                                                     |
| Total Split (%)         | 35.6%                                                                               | 35.6%                                                                               |                                                                                     | 20.2%                                                                               | 20.2%                                                                               |                                                                                     | 35.6%                                                                               | 35.6%                                                                               |                                                                                     | 35.6%                                                                               | 35.6%                                                                               |                                                                                     | 3%                                                                                  | 3%                                                                                  | 3%                                                                                  | 3%                                                                                  |                                                                                     |                                                                                     |
| Yellow Time (s)         | 4.0                                                                                 | 4.0                                                                                 |                                                                                     | 3.0                                                                                 | 3.0                                                                                 |                                                                                     | 4.0                                                                                 | 4.0                                                                                 |                                                                                     | 4.0                                                                                 | 4.0                                                                                 |                                                                                     | 2.0                                                                                 | 2.0                                                                                 | 2.0                                                                                 | 2.0                                                                                 |                                                                                     |                                                                                     |
| All-Red Time (s)        | 3.0                                                                                 | 3.0                                                                                 |                                                                                     | 3.0                                                                                 | 3.0                                                                                 |                                                                                     | 3.0                                                                                 | 3.0                                                                                 |                                                                                     | 3.0                                                                                 | 3.0                                                                                 |                                                                                     | 0.0                                                                                 | 0.0                                                                                 | 0.0                                                                                 | 0.0                                                                                 |                                                                                     |                                                                                     |
| Lost Time Adjust (s)    | 0.0                                                                                 | 0.0                                                                                 |                                                                                     | 0.0                                                                                 | 0.0                                                                                 |                                                                                     | 0.0                                                                                 | 0.0                                                                                 |                                                                                     | 0.0                                                                                 | 0.0                                                                                 |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Total Lost Time (s)     | 7.0                                                                                 | 7.0                                                                                 |                                                                                     | 6.0                                                                                 | 7.0                                                                                 |                                                                                     | 7.0                                                                                 | 7.0                                                                                 |                                                                                     | 7.0                                                                                 | 7.0                                                                                 |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Lead/Lag                | Lag                                                                                 | Lag                                                                                 |                                                                                     | Lag                                                                                 | Lag                                                                                 |                                                                                     | Lag                                                                                 | Lag                                                                                 |                                                                                     | Lag                                                                                 | Lag                                                                                 |                                                                                     | Lead                                                                                | Lead                                                                                | Lead                                                                                | Lead                                                                                |                                                                                     |                                                                                     |
| Lead-Lag Optimize?      |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Recall Mode             | None                                                                                | None                                                                                |                                                                                     | None                                                                                | None                                                                                |                                                                                     | None                                                                                | None                                                                                |                                                                                     | None                                                                                | None                                                                                |                                                                                     | None                                                                                | None                                                                                | None                                                                                | None                                                                                |                                                                                     |                                                                                     |
| Act Effect Green (s)    | 28.2                                                                                | 28.2                                                                                |                                                                                     | 15.0                                                                                | 29.9                                                                                |                                                                                     | 29.9                                                                                | 29.9                                                                                |                                                                                     | 30.5                                                                                | 64.4                                                                                |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Actuated g/C Ratio      | 0.30                                                                                | 0.30                                                                                |                                                                                     | 0.16                                                                                | 0.32                                                                                |                                                                                     | 0.32                                                                                | 0.32                                                                                |                                                                                     | 0.32                                                                                | 0.68                                                                                |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| v/c Ratio               | 0.75                                                                                | 0.27                                                                                |                                                                                     | 1.02                                                                                | 0.19                                                                                |                                                                                     | 0.55                                                                                | 0.87                                                                                |                                                                                     | 0.87                                                                                | 0.72                                                                                |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Control Delay           | 35.6                                                                                | 23.7                                                                                |                                                                                     | 93.0                                                                                | 29.2                                                                                |                                                                                     | 32.2                                                                                |                                                                                     |                                                                                     | 51.2                                                                                | 8.1                                                                                 |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Queue Delay             | 0.0                                                                                 | 0.0                                                                                 |                                                                                     | 0.0                                                                                 | 0.0                                                                                 |                                                                                     | 0.0                                                                                 | 0.0                                                                                 |                                                                                     | 0.0                                                                                 | 0.0                                                                                 |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Total Delay             | 35.6                                                                                | 23.7                                                                                |                                                                                     | 93.0                                                                                | 29.2                                                                                |                                                                                     | 32.2                                                                                |                                                                                     |                                                                                     | 51.2                                                                                | 8.1                                                                                 |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| LOS                     | D                                                                                   | C                                                                                   |                                                                                     | F                                                                                   | C                                                                                   |                                                                                     | C                                                                                   | C                                                                                   |                                                                                     | D                                                                                   | A                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Approach Delay          |                                                                                     | 33.7                                                                                |                                                                                     | 93.0                                                                                |                                                                                     |                                                                                     | 31.9                                                                                |                                                                                     |                                                                                     | 22.3                                                                                |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Approach LOS            |                                                                                     | C                                                                                   |                                                                                     | F                                                                                   |                                                                                     |                                                                                     | C                                                                                   |                                                                                     |                                                                                     | C                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Queue Length 50th (ft)  | 206                                                                                 | 56                                                                                  |                                                                                     | -177                                                                                | 14                                                                                  |                                                                                     | 159                                                                                 |                                                                                     |                                                                                     | 244                                                                                 | 114                                                                                 |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Queue Length 95th (ft)  | 305                                                                                 | 116                                                                                 |                                                                                     | #390                                                                                | 44                                                                                  |                                                                                     | 276                                                                                 |                                                                                     |                                                                                     | #452                                                                                | 263                                                                                 |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Internal Link Dist (ft) |                                                                                     | 1055                                                                                |                                                                                     | 371                                                                                 |                                                                                     |                                                                                     | 554                                                                                 |                                                                                     |                                                                                     | 642                                                                                 |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Turn Bay Length (ft)    | 340                                                                                 |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     | 100                                                                                 |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Base Capacity (vph)     | 1087                                                                                | 573                                                                                 |                                                                                     | 313                                                                                 | 176                                                                                 |                                                                                     | 588                                                                                 |                                                                                     |                                                                                     | 992                                                                                 | 1244                                                                                |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Starvation Cap Reductn  | 0                                                                                   | 0                                                                                   |                                                                                     | 0                                                                                   | 0                                                                                   |                                                                                     | 0                                                                                   | 0                                                                                   |                                                                                     | 0                                                                                   | 0                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Spillback Cap Reductn   | 0                                                                                   | 0                                                                                   |                                                                                     | 0                                                                                   | 0                                                                                   |                                                                                     | 0                                                                                   | 0                                                                                   |                                                                                     | 0                                                                                   | 0                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Storage Cap Reductn     | 0                                                                                   | 0                                                                                   |                                                                                     | 0                                                                                   | 0                                                                                   |                                                                                     | 0                                                                                   | 0                                                                                   |                                                                                     | 0                                                                                   | 0                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Reduced v/c Ratio       | 0.70                                                                                | 0.25                                                                                |                                                                                     | 1.02                                                                                | 0.19                                                                                |                                                                                     | 0.54                                                                                |                                                                                     |                                                                                     | 0.87                                                                                | 0.70                                                                                |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |

12239.00 :: Needham Street  
14: Winchester Street & Needham Street/Dedham Street

2025 No Build Conditions  
Timing Plan: Weekday Morning



12239.00 :: Needham Street  
15: Winchester Street & Route 9 EB Access Road

2025 No Build Conditions  
Timing Plan: Weekday Morning

| Lane Group                                                        | WBL   | WBR    | NBT   | NBR    | SBL    | SBT                    | Ø2   | Ø3   | Ø4   | Ø5   | Ø6   |
|-------------------------------------------------------------------|-------|--------|-------|--------|--------|------------------------|------|------|------|------|------|
| Lane Configurations                                               | ↔     | ↔      | ↕     | ↕      | ↔      | ↕                      |      |      |      |      |      |
| Traffic Volume (vph)                                              | 55    | 285    | 995   | 205    | 65     | 1200                   |      |      |      |      |      |
| Future Volume (vph)                                               | 55    | 285    | 995   | 205    | 65     | 1200                   |      |      |      |      |      |
| Ideal Flow (vphpl)                                                | 1900  | 1900   | 1900  | 1900   | 1900   | 1900                   |      |      |      |      |      |
| Storage Length (ft)                                               | 200   | 0      |       | 100    | 0      |                        |      |      |      |      |      |
| Storage Lanes                                                     | 1     | 1      |       | 1      | 1      |                        |      |      |      |      |      |
| Taper Length (ft)                                                 | 25    |        |       |        | 25     |                        |      |      |      |      |      |
| Satd. Flow (prot)                                                 | 1787  | 1599   | 1881  | 1599   | 1787   | 1881                   |      |      |      |      |      |
| Flt Permitted                                                     | 0.950 |        |       |        | 0.073  |                        |      |      |      |      |      |
| Satd. Flow (perm)                                                 | 1787  | 1599   | 1881  | 1508   | 137    | 1881                   |      |      |      |      |      |
| Right Turn on Red                                                 |       | Yes    |       | Yes    |        |                        |      |      |      |      |      |
| Satd. Flow (RTOR)                                                 |       | 117    |       | 49     |        |                        |      |      |      |      |      |
| Link Speed (mph)                                                  | 30    |        | 30    |        |        | 30                     |      |      |      |      |      |
| Link Distance (ft)                                                | 443   |        | 400   |        |        | 252                    |      |      |      |      |      |
| Travel Time (s)                                                   | 10.1  |        | 9.1   |        |        | 5.7                    |      |      |      |      |      |
| Confl. Peds. (#/hr)                                               |       |        |       | 9      | 9      |                        |      |      |      |      |      |
| Peak Hour Factor                                                  | 0.92  | 0.92   | 0.92  | 0.92   | 0.92   | 0.92                   |      |      |      |      |      |
| Heavy Vehicles (%)                                                | 1%    | 1%     | 1%    | 1%     | 1%     | 1%                     |      |      |      |      |      |
| Shared Lane Traffic (%)                                           |       |        |       |        |        |                        |      |      |      |      |      |
| Lane Group Flow (vph)                                             | 60    | 310    | 1082  | 223    | 71     | 1304                   |      |      |      |      |      |
| Turn Type                                                         | Prot  | custom | NA    | custom | custom | NA                     |      |      |      |      |      |
| Protected Phases                                                  | 5 6   | 1 5 6  | 2 3   | 5 6    | 1      | 1 2 3 4                | 2    | 3    | 4    | 5    | 6    |
| Permitted Phases                                                  |       |        |       | 2      | 2      |                        |      |      |      |      |      |
| Detector Phase                                                    | 5 6   | 1 5 6  | 2 3   | 5 6    | 1      | 1 2 3 4                |      |      |      |      |      |
| Switch Phase                                                      |       |        |       |        |        |                        |      |      |      |      |      |
| Minimum Initial (s)                                               |       |        |       |        | 4.0    |                        | 10.0 | 10.0 | 4.0  | 4.0  | 4.0  |
| Minimum Split (s)                                                 |       |        |       |        | 10.0   |                        | 25.0 | 27.0 | 10.0 | 11.0 | 9.0  |
| Total Split (s)                                                   |       |        |       |        | 23.0   |                        | 61.0 | 28.0 | 10.0 | 27.0 | 9.0  |
| Total Split (%)                                                   |       |        |       |        | 14.6%  |                        | 39%  | 18%  | 6%   | 17%  | 6%   |
| Yellow Time (s)                                                   |       |        |       |        | 4.0    |                        | 4.0  | 4.0  | 4.0  | 3.0  | 3.0  |
| All-Red Time (s)                                                  |       |        |       |        | 2.0    |                        | 2.0  | 2.0  | 2.0  | 4.0  | 2.0  |
| Lost Time Adjust (s)                                              |       |        |       |        | 0.0    |                        |      |      |      |      |      |
| Total Lost Time (s)                                               |       |        |       |        | 6.0    |                        |      |      |      |      |      |
| Lead/Lag                                                          |       |        |       |        | Lead   |                        | Lag  | Lead | Lag  | Lead | Lag  |
| Lead-Lag Optimize?                                                |       |        |       |        |        |                        |      |      |      |      |      |
| Recall Mode                                                       |       |        |       |        | None   |                        | None | None | None | None | None |
| Act Effct Green (s)                                               | 29.0  | 53.0   | 83.0  | 83.0   | 72.0   | 116.0                  |      |      |      |      |      |
| Actuated g/C Ratio                                                | 0.18  | 0.34   | 0.53  | 0.53   | 0.46   | 0.73                   |      |      |      |      |      |
| v/c Ratio                                                         | 0.18  | 0.50   | 1.10  | 0.27   | 0.30   | 0.94                   |      |      |      |      |      |
| Control Delay                                                     | 56.3  | 28.5   | 94.1  | 9.1    | 33.0   | 14.0                   |      |      |      |      |      |
| Queue Delay                                                       | 0.0   | 4.3    | 2.5   | 0.0    | 0.0    | 44.8                   |      |      |      |      |      |
| Total Delay                                                       | 56.3  | 32.9   | 96.6  | 9.1    | 33.0   | 58.9                   |      |      |      |      |      |
| LOS                                                               | E     | C      | F     | A      | C      | E                      |      |      |      |      |      |
| Approach Delay                                                    | 36.7  |        | 81.6  |        |        | 57.5                   |      |      |      |      |      |
| Approach LOS                                                      | D     |        | F     |        |        | E                      |      |      |      |      |      |
| Queue Length 50th (ft)                                            | 53    | 159    | ~1258 | 53     | 38     | 288                    |      |      |      |      |      |
| Queue Length 95th (ft)                                            | 99    | 257    | #1523 | 84     | m32    | m179                   |      |      |      |      |      |
| Internal Link Dist (ft)                                           | 363   |        | 320   |        |        | 172                    |      |      |      |      |      |
| Turn Bay Length (ft)                                              | 200   |        |       | 100    |        |                        |      |      |      |      |      |
| Base Capacity (vph)                                               | 327   | 614    | 988   | 832    | 239    | 1380                   |      |      |      |      |      |
| Starvation Cap Reductn                                            | 0     | 0      | 21    | 0      | 0      | 386                    |      |      |      |      |      |
| Spillback Cap Reductn                                             | 0     | 226    | 101   | 0      | 0      | 0                      |      |      |      |      |      |
| Storage Cap Reductn                                               | 0     | 0      | 0     | 0      | 0      | 0                      |      |      |      |      |      |
| Reduced v/c Ratio                                                 | 0.18  | 0.80   | 1.22  | 0.27   | 0.30   | 1.31                   |      |      |      |      |      |
| Intersection Summary                                              |       |        |       |        |        |                        |      |      |      |      |      |
| Area Type:                                                        | Other |        |       |        |        |                        |      |      |      |      |      |
| Cycle Length: 158                                                 |       |        |       |        |        |                        |      |      |      |      |      |
| Actuated Cycle Length: 158                                        |       |        |       |        |        |                        |      |      |      |      |      |
| Natural Cycle: 145                                                |       |        |       |        |        |                        |      |      |      |      |      |
| Control Type: Actuated-Uncoordinated                              |       |        |       |        |        |                        |      |      |      |      |      |
| Maximum v/c Ratio: 1.29                                           |       |        |       |        |        |                        |      |      |      |      |      |
| Intersection Signal Delay: 65.3                                   |       |        |       |        |        | Intersection LOS: E    |      |      |      |      |      |
| Intersection Capacity Utilization 80.0%                           |       |        |       |        |        | ICU Level of Service D |      |      |      |      |      |
| Analysis Period (min) 15                                          |       |        |       |        |        |                        |      |      |      |      |      |
| - Volume exceeds capacity, queue is theoretically infinite.       |       |        |       |        |        |                        |      |      |      |      |      |
| - Queue shown is maximum after two cycles.                        |       |        |       |        |        |                        |      |      |      |      |      |
| # 95th percentile volume exceeds capacity, queue may be longer.   |       |        |       |        |        |                        |      |      |      |      |      |
| - Queue shown is maximum after two cycles.                        |       |        |       |        |        |                        |      |      |      |      |      |
| m Volume for 95th percentile queue is metered by upstream signal. |       |        |       |        |        |                        |      |      |      |      |      |



12239.00 :: Needham Street  
16: Winchester Street/Centre Street & Route 9 WB Access Road & Driveway  
2025 No Build Conditions  
Timing Plan: Weekday Morning



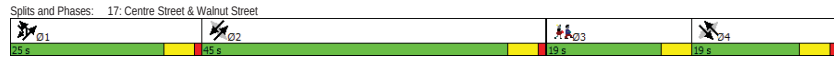
12239.00 :: Needham Street  
17: Centre Street & Walnut Street  
2025 No Build Conditions  
Timing Plan: Weekday Morning

| Lane Group                                                      | SEL                    | SET   | SER   | NWL   | NWT   | NWR  | NEL   | NET  | NER   | SWL   | SWT  | SWR  | Ø3 |
|-----------------------------------------------------------------|------------------------|-------|-------|-------|-------|------|-------|------|-------|-------|------|------|----|
| Lane Configurations                                             |                        | ↰     |       |       | ↱     |      |       | ↱    |       |       | ↱    |      |    |
| Traffic Volume (vph)                                            | 20                     | 1     | 395   | 35    | 40    | 0    | 385   | 680  | 2     | 1     | 720  | 30   |    |
| Future Volume (vph)                                             | 20                     | 1     | 395   | 35    | 40    | 0    | 385   | 680  | 2     | 1     | 720  | 30   |    |
| Ideal Flow (vphpl)                                              | 1900                   | 1900  | 1900  | 1900  | 1900  | 1900 | 1900  | 1900 | 1900  | 1900  | 1900 | 1900 |    |
| Storage Length (ft)                                             | 0                      |       | 50    | 0     |       | 0    | 75    |      | 0     | 0     |      | 0    |    |
| Storage Lanes                                                   | 0                      |       | 1     | 0     |       | 0    | 1     |      | 0     | 0     |      | 0    |    |
| Taper Length (ft)                                               | 25                     |       |       | 25    |       |      | 25    |      |       | 25    |      |      |    |
| Satd. Flow (prot)                                               | 0                      | 1813  | 1615  | 0     | 1856  | 0    | 1770  | 1863 | 0     | 0     | 1889 | 0    |    |
| Flt Permitted                                                   |                        | 0.745 |       |       | 0.839 |      | 0.185 |      |       |       |      |      |    |
| Satd. Flow (perm)                                               | 0                      | 1346  | 1573  | 0     | 1583  | 0    | 344   | 1863 | 0     | 0     | 1889 | 0    |    |
| Right Turn on Red                                               |                        |       | No    |       | No    |      |       |      | Yes   |       |      | Yes  |    |
| Satd. Flow (RTOR)                                               |                        |       |       |       |       |      |       |      |       |       | 2    |      |    |
| Link Speed (mph)                                                |                        | 30    |       |       | 30    |      |       | 30   |       |       | 30   |      |    |
| Link Distance (ft)                                              |                        | 624   |       |       | 387   |      |       | 508  |       |       | 531  |      |    |
| Travel Time (s)                                                 |                        | 14.2  |       |       | 8.8   |      |       | 11.5 |       |       | 12.1 |      |    |
| Confl. Peds. (#/hr)                                             | 17                     |       | 4     | 4     |       | 17   | 3     |      | 9     | 9     |      | 3    |    |
| Peak Hour Factor                                                | 0.92                   | 0.92  | 0.92  | 0.92  | 0.92  | 0.92 | 0.92  | 0.92 | 0.92  | 0.92  | 0.92 | 0.92 |    |
| Heavy Vehicles (%)                                              | 0%                     | 0%    | 0%    | 0%    | 0%    | 0%   | 2%    | 2%   | 2%    | 0%    | 0%   | 0%   |    |
| Shared Lane Traffic (%)                                         |                        |       |       |       |       |      |       |      |       |       |      |      |    |
| Lane Group Flow (vph)                                           | 0                      | 23    | 429   | 0     | 81    | 0    | 418   | 741  | 0     | 0     | 817  | 0    |    |
| Turn Type                                                       | Perm                   | NA    | pm+ov | Perm  | NA    |      | D,P+P | NA   | Perm  | NA    |      |      |    |
| Protected Phases                                                |                        | 4     | 1     |       | 4     |      | 1     | 1 2  |       |       | 2    | 3    |    |
| Permitted Phases                                                | 4                      |       | 4     | 4     |       |      | 2     |      |       | 2     |      |      |    |
| Detector Phase                                                  | 4                      | 4     | 1     | 4     | 4     |      | 1     | 1 2  |       | 2     | 2    |      |    |
| Switch Phase                                                    |                        |       |       |       |       |      |       |      |       |       |      |      |    |
| Minimum Initial (s)                                             | 9.0                    | 9.0   | 7.0   | 9.0   | 9.0   |      | 7.0   |      | 6.0   | 6.0   |      | 4.0  |    |
| Minimum Split (s)                                               | 14.0                   | 14.0  | 12.0  | 14.0  | 14.0  |      | 12.0  |      | 11.0  | 11.0  |      | 19.0 |    |
| Total Split (s)                                                 | 19.0                   | 19.0  | 25.0  | 19.0  | 19.0  |      | 25.0  |      | 45.0  | 45.0  |      | 19.0 |    |
| Total Split (%)                                                 | 17.6%                  | 17.6% | 23.1% | 17.6% | 17.6% |      | 23.1% |      | 41.7% | 41.7% |      | 18%  |    |
| Yellow Time (s)                                                 | 4.0                    | 4.0   | 4.0   | 4.0   | 4.0   |      | 4.0   |      | 4.0   | 4.0   |      | 4.0  |    |
| All-Red Time (s)                                                | 1.0                    | 1.0   | 1.0   | 1.0   | 1.0   |      | 1.0   |      | 1.0   | 1.0   |      | 0.0  |    |
| Lost Time Adjust (s)                                            | 0.0                    | 0.0   | 0.0   | 0.0   | 0.0   |      | 0.0   |      | 0.0   | 0.0   |      | 0.0  |    |
| Total Lost Time (s)                                             | 5.0                    | 5.0   |       | 5.0   | 5.0   |      | 5.0   |      |       | 5.0   |      |      |    |
| Lead/Lag                                                        | Lag                    | Lag   | Lead  | Lag   | Lag   |      | Lead  |      |       | Lag   | Lag  | Lead |    |
| Lead-Lag Optimize?                                              |                        |       |       |       |       |      |       |      |       |       |      |      |    |
| Recall Mode                                                     | Min                    | Min   | Max   | Min   | Min   |      | Max   |      | Max   | Max   |      | None |    |
| Act Effct Green (s)                                             | 10.6                   |       | 30.8  |       | 10.6  |      | 60.8  | 65.8 |       |       | 40.5 |      |    |
| Actuated g/C Ratio                                              | 0.11                   |       | 0.32  |       | 0.11  |      | 0.63  | 0.68 |       |       | 0.42 |      |    |
| v/c Ratio                                                       | 0.16                   |       | 0.84  |       | 0.47  |      | 0.81  | 0.59 |       |       | 1.04 |      |    |
| Control Delay                                                   | 44.7                   |       | 47.3  |       | 52.5  |      | 32.8  | 13.0 |       |       | 72.3 |      |    |
| Queue Delay                                                     | 0.0                    |       | 0.0   |       | 0.0   |      | 0.0   | 1.5  |       |       | 0.0  |      |    |
| Total Delay                                                     | 44.7                   |       | 47.3  |       | 52.5  |      | 32.8  | 14.5 |       |       | 72.3 |      |    |
| LOS                                                             | D                      |       | D     |       | D     |      | C     | B    |       |       | E    |      |    |
| Approach Delay                                                  | 47.2                   |       |       |       | 52.5  |      |       | 21.1 |       |       | 72.3 |      |    |
| Approach LOS                                                    | D                      |       |       |       | D     |      |       | C    |       |       | E    |      |    |
| Queue Length 50th (ft)                                          | 14                     |       | 256   |       | 52    |      | 170   | 279  |       |       | ~627 |      |    |
| Queue Length 95th (ft)                                          | 40                     |       | #450  |       | 101   |      | #374  | 448  |       |       | #915 |      |    |
| Internal Link Dist (ft)                                         | 544                    |       |       |       | 307   |      |       | 428  |       |       | 451  |      |    |
| Turn Bay Length (ft)                                            |                        |       | 50    |       |       |      | 75    |      |       |       |      |      |    |
| Base Capacity (vph)                                             | 196                    |       | 508   |       | 231   |      | 513   | 1264 |       |       | 789  |      |    |
| Starvation Cap Reductn                                          | 0                      |       | 0     |       | 0     |      | 0     | 323  |       |       | 0    |      |    |
| Spillback Cap Reductn                                           | 0                      |       | 0     |       | 0     |      | 0     | 0    |       |       | 0    |      |    |
| Storage Cap Reductn                                             | 0                      |       | 0     |       | 0     |      | 0     | 0    |       |       | 0    |      |    |
| Reduced v/c Ratio                                               | 0.12                   |       | 0.84  |       | 0.35  |      | 0.81  | 0.79 |       |       | 1.04 |      |    |
| Intersection Summary                                            |                        |       |       |       |       |      |       |      |       |       |      |      |    |
| Area Type:                                                      | Other                  |       |       |       |       |      |       |      |       |       |      |      |    |
| Cycle Length: 108                                               |                        |       |       |       |       |      |       |      |       |       |      |      |    |
| Actuated Cycle Length: 97                                       |                        |       |       |       |       |      |       |      |       |       |      |      |    |
| Natural Cycle: 100                                              |                        |       |       |       |       |      |       |      |       |       |      |      |    |
| Control Type: Semi Act-Uncooord                                 |                        |       |       |       |       |      |       |      |       |       |      |      |    |
| Maximum v/c Ratio: 1.04                                         |                        |       |       |       |       |      |       |      |       |       |      |      |    |
| Intersection Signal Delay: 43.5                                 | Intersection LOS: D    |       |       |       |       |      |       |      |       |       |      |      |    |
| Intersection Capacity Utilization 98.9%                         | ICU Level of Service F |       |       |       |       |      |       |      |       |       |      |      |    |
| Analysis Period (min) 15                                        |                        |       |       |       |       |      |       |      |       |       |      |      |    |
| - Volume exceeds capacity, queue is theoretically infinite.     |                        |       |       |       |       |      |       |      |       |       |      |      |    |
| - Queue shown is maximum after two cycles.                      |                        |       |       |       |       |      |       |      |       |       |      |      |    |
| # 95th percentile volume exceeds capacity, queue may be longer. |                        |       |       |       |       |      |       |      |       |       |      |      |    |
| - Queue shown is maximum after two cycles.                      |                        |       |       |       |       |      |       |      |       |       |      |      |    |



12239.00 :: Needham Street  
17: Centre Street & Walnut Street

2025 No Build Conditions  
Timing Plan: Weekday Morning



12239.00 :: Needham Street  
18: Nahanton Street & Winchester Street

2025 No Build Conditions  
Timing Plan: Weekday Morning

| Lane Group              | EBL   | EBT   | WBT   | WBR  | SBL   | SBR   |
|-------------------------|-------|-------|-------|------|-------|-------|
| Lane Configurations     |       |       |       |      |       |       |
| Traffic Volume (vph)    | 260   | 535   | 715   | 25   | 30    | 345   |
| Future Volume (vph)     | 260   | 535   | 715   | 25   | 30    | 345   |
| Ideal Flow (vphpl)      | 1900  | 1900  | 1900  | 1900 | 1900  | 1900  |
| Storage Length (ft)     | 175   |       |       |      | 0     | 75    |
| Storage Lanes           | 1     |       |       |      | 0     | 1     |
| Taper Length (ft)       | 25    |       |       |      | 25    |       |
| Satd. Flow (prot)       | 1787  | 1881  | 1872  | 0    | 1787  | 1599  |
| Flt Permitted           | 0.175 |       |       |      | 0.950 |       |
| Satd. Flow (perm)       | 329   | 1881  | 1872  | 0    | 1787  | 1599  |
| Right Turn on Red       |       |       |       | Yes  |       | No    |
| Satd. Flow (RTOR)       |       |       | 3     |      |       |       |
| Link Speed (mph)        |       | 30    | 30    |      | 30    |       |
| Link Distance (ft)      |       | 963   | 734   |      | 889   |       |
| Travel Time (s)         |       | 21.9  | 16.7  |      | 20.2  |       |
| Peak Hour Factor        | 0.92  | 0.92  | 0.92  | 0.92 | 0.92  | 0.92  |
| Heavy Vehicles (%)      | 1%    | 1%    | 1%    | 1%   | 1%    | 1%    |
| Shared Lane Traffic (%) |       |       |       |      |       |       |
| Lane Group Flow (vph)   | 283   | 582   | 804   | 0    | 33    | 375   |
| Turn Type               | pm+pt | NA    | NA    |      | Prot  | pt+ov |
| Protected Phases        | 5     | 2     | 6     |      | 8     | 5 8   |
| Permitted Phases        | 2     |       |       |      |       |       |
| Detector Phase          | 5     | 2     | 6     |      | 8     | 5 8   |
| Switch Phase            |       |       |       |      |       |       |
| Minimum Initial (s)     | 6.0   | 10.0  | 10.0  |      | 6.0   |       |
| Minimum Split (s)       | 11.0  | 15.0  | 23.0  |      | 10.0  |       |
| Total Split (s)         | 29.0  | 100.0 | 71.0  |      | 15.0  |       |
| Total Split (%)         | 25.2% | 87.0% | 61.7% |      | 13.0% |       |
| Yellow Time (s)         | 3.0   | 3.0   | 3.0   |      | 3.0   |       |
| All-Red Time (s)        | 2.0   | 2.0   | 2.0   |      | 1.0   |       |
| Lost Time Adjust (s)    | 0.0   | 0.0   | 0.0   |      | 0.0   |       |
| Total Lost Time (s)     | 5.0   | 5.0   | 5.0   |      | 4.0   |       |
| Lead/Lag                | Lead  |       | Lag   |      |       |       |
| Lead-Lag Optimize?      | Yes   |       | Yes   |      |       |       |
| Recall Mode             | None  | C-Min | None  |      | None  |       |
| Act Effct Green (s)     | 88.7  | 88.7  | 68.2  |      | 17.3  | 36.8  |
| Actuated g/C Ratio      | 0.77  | 0.77  | 0.59  |      | 0.15  | 0.32  |
| v/c Ratio               | 0.63  | 0.40  | 0.72  |      | 0.12  | 0.73  |
| Control Delay           | 12.1  | 5.1   | 22.0  |      | 46.4  | 43.8  |
| Queue Delay             | 0.0   | 0.0   | 0.0   |      | 0.0   | 0.0   |
| Total Delay             | 12.1  | 5.1   | 22.0  |      | 46.4  | 43.8  |
| LOS                     | B     | A     | C     |      | D     | D     |
| Approach Delay          | 7.4   | 22.0  |       |      | 44.0  |       |
| Approach LOS            |       | A     | C     |      | D     |       |
| Queue Length 50th (ft)  | 57    | 143   | 395   |      | 21    | 247   |
| Queue Length 95th (ft)  | 90    | 115   | 586   |      | 55    | 352   |
| Internal Link Dist (ft) |       | 883   | 654   |      | 809   |       |
| Turn Bay Length (ft)    | 175   |       |       |      | 75    |       |
| Base Capacity (vph)     | 558   | 1553  | 1114  |      | 268   | 629   |
| Starvation Cap Reductn  | 0     | 0     | 0     |      | 0     | 0     |
| Spillback Cap Reductn   | 0     | 0     | 0     |      | 0     | 0     |
| Storage Cap Reductn     | 0     | 0     | 0     |      | 0     | 0     |
| Reduced v/c Ratio       | 0.51  | 0.37  | 0.72  |      | 0.12  | 0.60  |

| Intersection Summary                                       |                        |
|------------------------------------------------------------|------------------------|
| Area Type:                                                 | Other                  |
| Cycle Length: 115                                          |                        |
| Actuated Cycle Length: 115                                 |                        |
| Offset: 8 (7%), Referenced to phase 2:EBTL, Start of Green |                        |
| Natural Cycle: 60                                          |                        |
| Control Type: Actuated-Coordinated                         |                        |
| Maximum v/c Ratio: 0.73                                    |                        |
| Intersection Signal Delay: 20.3                            | Intersection LOS: C    |
| Intersection Capacity Utilization 70.2%                    | ICU Level of Service C |
| Analysis Period (min) 15                                   |                        |



2025 No Build Conditions  
Timing Plan: Weekday Morning

| Intersection Summary              |                                                               |
|-----------------------------------|---------------------------------------------------------------|
| Area Type:                        | Other                                                         |
| Cycle Length:                     | 91                                                            |
| Actuated Cycle Length:            | 77.8                                                          |
| Natural Cycle:                    | 60                                                            |
| Control Type:                     | Actuated-Uncoordinated                                        |
| Maximum v/c Ratio:                | 0.79                                                          |
| Intersection Signal Delay:        | 17.4                                                          |
| Intersection Capacity Utilization | 82.7%                                                         |
| Analysis Period (min)             | 15                                                            |
| #                                 | 95th percentile volume exceeds capacity, queue may be longer. |
|                                   | Queue shown is maximum after two cycles.                      |

| Upth and Tides:                                                                             |                                                                                             | 20: West Midlands Strategy & National Grid                                                  |  |
|---------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------|--|
| <br>55 s | <br>20 s | <br>16 s |  |

12239.00 :: Needham Street 2025 No Build Conditions  
 20: Highland Avenue & Riverside Street Timing Plan: Weekday Morning

| Major/Minor          | Minor1 | Major1 | Major2 |            |
|----------------------|--------|--------|--------|------------|
| Conflicting Flow All | 2133   | 567    | 0      | 0 1128 0   |
| Stage 1              | 1125   | -      | -      | -          |
| Stage 2              | 1008   | -      | -      | -          |
| Critical Hdwy        | 6.6    | 6.9    | -      | - 4.115 -  |
| Critical Hdwy Stg 1  | 5.8    | -      | -      | -          |
| Critical Hdwy Stg 2  | 5.4    | -      | -      | -          |
| Follow-up Hdwy       | 3.5    | 3.3    | -      | - 2.2095 - |
| Pot Cap-1 Maneuver   | 49     | 472    | -      | - 622 -    |
| Stage 1              | 276    | -      | -      | -          |
| Stage 2              | 356    | -      | -      | -          |
| Platoon blocked, %   |        |        | -      | -          |
| Mov Cap-1 Maneuver   | 49     | 470    | -      | - 621 -    |
| Mov Cap-2 Maneuver   | 49     | -      | -      | -          |
| Stage 1              | 275    | -      | -      | -          |
| Stage 2              | 355    | -      | -      | -          |

| Minor Lane/Major Mvmt | NET | NER | NWLn1 | SWL   | SWT |
|-----------------------|-----|-----|-------|-------|-----|
| Capacity (veh/h)      | -   | -   | 53    | 621   | -   |
| HCM Lane V/C Ratio    | -   | -   | 0.226 | 0.002 | -   |
| HCM Control Delay (s) | -   | -   | 91.7  | 10.8  | 0   |
| HCM Lane LOS          | -   | -   | F     | B     | A   |
| HCM 95th %ile Q(veh)  | -   | -   | 0.8   | 0     | -   |

2025 No Build Conditions  
Timing Plan: Weekday Morning

| Minor Lane/Major Mvmt | NEL   | NET | NER | NWLn1 | SELn1 | SWL   | SWT | SWR |
|-----------------------|-------|-----|-----|-------|-------|-------|-----|-----|
| Capacity (veh/h)      | 682   | -   | -   | 114   | 249   | 621   | -   | -   |
| HCM Lane V/C Ratio    | 0.008 | -   | -   | 0.095 | 0.026 | 0.004 | -   | -   |
| HCM Control Delay (s) | 10.3  | 0.1 | -   | 39.9  | 19.8  | 10.8  | 0   | -   |
| HCM Lane LOS          | B     | A   | -   | E     | C     | B     | A   | -   |
| HCM 95th %tile Q(veh) | 0     | -   | -   | 0.3   | 0.1   | 0     | -   | -   |

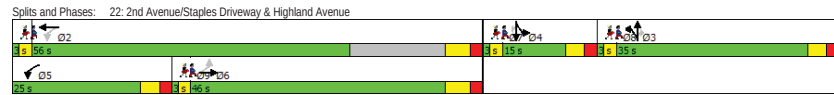
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07/03/2018

2025 No Build Conditions  
Timing Plan: Weekday Morning

| Intersection Summary                                            |                        |
|-----------------------------------------------------------------|------------------------|
| Area Type:                                                      | Other                  |
| Cycle Length:                                                   | 130                    |
| Actuated Cycle Length:                                          | 77.8                   |
| Natural Cycle:                                                  | 130                    |
| Control Type:                                                   | Actuated-Uncoordinated |
| Maximum v/c Ratio:                                              | 0.96                   |
| Intersection Signal Delay:                                      | 26.5                   |
| Intersection Capacity Utilization:                              | 83.4%                  |
| Analysis Period (min):                                          | 15                     |
| # 95th percentile volume exceeds capacity, queue may be longer. |                        |
| Queue shown is maximum after two cycles.                        |                        |
| d) Defacto Left Lane. Recode with 1 though lane as a left lane. |                        |

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2025 No Build Conditions  
Timing Plan: Weekday Morning



Lanes, Volumes, Timings  
VHB/MSD

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07/03/2018

2025 No Build Conditions  
Timing Plan: Weekday Morning

| Intersection              |                                                                                     |                                                                                     |                                                                                     |      |                                                                                     |       |
|---------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|------|-------------------------------------------------------------------------------------|-------|
| Int Delay, s/veh          | 0.5                                                                                 |                                                                                     |                                                                                     |      |                                                                                     |       |
| Movement                  | EBL                                                                                 | EBT                                                                                 | WBT                                                                                 | WBR  | SEB                                                                                 | SEB   |
| Lane Configurations       |  |  |  |      |  |       |
| Traffic Vol, veh/h        | 30                                                                                  | 1060                                                                                | 750                                                                                 | 20   | 5                                                                                   | 35    |
| Future Vol, veh/h         | 30                                                                                  | 1060                                                                                | 750                                                                                 | 20   | 5                                                                                   | 35    |
| Conflicting Peds, #/hr    | 4                                                                                   | 0                                                                                   | 0                                                                                   | 4    | 0                                                                                   | 0     |
| Sign Control              | Free                                                                                | Free                                                                                | Free                                                                                | Free | Stop                                                                                | Stop  |
| RT Channelized            | -                                                                                   | None                                                                                | -                                                                                   | None | -                                                                                   | None  |
| Storage Length            | 100                                                                                 | -                                                                                   | -                                                                                   | -    | 0                                                                                   | -     |
| Velh in Median Storage, # | -                                                                                   | 0                                                                                   | 0                                                                                   | -    | 0                                                                                   | -     |
| Grade, %                  | -                                                                                   | 0                                                                                   | 0                                                                                   | -    | 0                                                                                   | -     |
| Peak hour Factor          | 92                                                                                  | 92                                                                                  | 92                                                                                  | 92   | 92                                                                                  | 92    |
| Heavy Vehicles, %         | 1                                                                                   | 1                                                                                   | 2                                                                                   | 2    | 0                                                                                   | 0     |
| Mvmt Flow                 | 33                                                                                  | 1152                                                                                | 815                                                                                 | 22   | 5                                                                                   | 38    |
|                           |                                                                                     |                                                                                     |                                                                                     |      |                                                                                     |       |
| Major/Minor               | Major1                                                                              | Major2                                                                              | Minor2                                                                              |      |                                                                                     |       |
| Conflicting Flow All      | 841                                                                                 | 0                                                                                   | -                                                                                   | 0    | 1471                                                                                | 422   |
| Stage 1                   | -                                                                                   | -                                                                                   | -                                                                                   | -    | 830                                                                                 | -     |
| Stage 2                   | -                                                                                   | -                                                                                   | -                                                                                   | -    | 641                                                                                 | -     |
| Critical Hdwy             | 4.12                                                                                | -                                                                                   | -                                                                                   | -    | 6.8                                                                                 | 6.9   |
| Critical Hdwy Stg 1       | -                                                                                   | -                                                                                   | -                                                                                   | -    | 5.8                                                                                 | -     |
| Critical Hdwy Stg 2       | -                                                                                   | -                                                                                   | -                                                                                   | -    | 5.8                                                                                 | -     |
| Follow-up Hdwy            | 2.21                                                                                | -                                                                                   | -                                                                                   | -    | 3.5                                                                                 | 3.3   |
| Pot Cap-1 Maneuver        | 797                                                                                 | -                                                                                   | -                                                                                   | -    | 120                                                                                 | 586   |
| Stage 1                   | -                                                                                   | -                                                                                   | -                                                                                   | -    | 394                                                                                 | -     |
| Stage 2                   | -                                                                                   | -                                                                                   | -                                                                                   | -    | 492                                                                                 | -     |
| Platoon blocked, %        | -                                                                                   | -                                                                                   | -                                                                                   | -    | -                                                                                   | -     |
| Mov Cap-1 Maneuver        | 797                                                                                 | -                                                                                   | -                                                                                   | -    | 114                                                                                 | 584   |
| Mov Cap-2 Maneuver        | -                                                                                   | -                                                                                   | -                                                                                   | -    | 114                                                                                 | -     |
| Stage 1                   | -                                                                                   | -                                                                                   | -                                                                                   | -    | 393                                                                                 | -     |
| Stage 2                   | -                                                                                   | -                                                                                   | -                                                                                   | -    | 470                                                                                 | -     |
|                           |                                                                                     |                                                                                     |                                                                                     |      |                                                                                     |       |
| Approach                  | EB                                                                                  | WB                                                                                  |                                                                                     | SB   |                                                                                     |       |
| HCM Control Delay, s      | 0.3                                                                                 | 0                                                                                   |                                                                                     | 15.5 |                                                                                     |       |
| HCM LOS                   | C                                                                                   |                                                                                     |                                                                                     |      |                                                                                     |       |
|                           |                                                                                     |                                                                                     |                                                                                     |      |                                                                                     |       |
| Minor Lane/Major Mvmt     | EBL                                                                                 | EBT                                                                                 | WBT                                                                                 | WBR  | SEB                                                                                 | SEB   |
| Capacity (veh/h)          | 797                                                                                 | -                                                                                   | -                                                                                   | -    | -                                                                                   | 385   |
| HCM Lane V/C Ratio        | 0.041                                                                               | -                                                                                   | -                                                                                   | -    | -                                                                                   | 0.113 |
| HCM Control Delay (s)     | 9.7                                                                                 | -                                                                                   | -                                                                                   | -    | -                                                                                   | 15.5  |
| HCM Lane LOS              | A                                                                                   | -                                                                                   | -                                                                                   | -    | -                                                                                   | C     |
| HCM 95th %ile Q(veh)      | 0.1                                                                                 | -                                                                                   | -                                                                                   | -    | -                                                                                   | 0.4   |

HCM 2010 TWSC  
VHB/MSD

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12239.00 :: Needham Street  
24: Highland Avenue & Wexford Street

2025 No Build Conditions  
Timing Plan: Weekday Morning

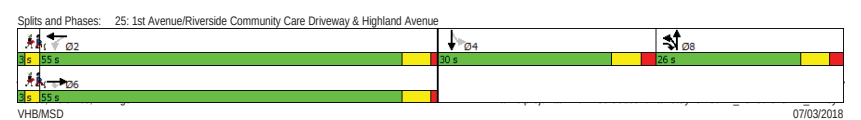
| Intersection             |        |      |        |       |       |      |
|--------------------------|--------|------|--------|-------|-------|------|
| Int Delay, s/veh         | 4      |      |        |       |       |      |
| Movement                 | EBL    | EBT  | WBT    | WBR   | SBL   | SBR  |
| Lane Configurations      | ↰      | ↰↱   | ↱↰     | ↱     | ↰     | ↱    |
| Traffic Vol, veh/h       | 115    | 1045 | 730    | 30    | 40    | 75   |
| Future Vol, veh/h        | 115    | 1045 | 730    | 30    | 40    | 75   |
| Conflicting Peds, #/hr   | 3      | 0    | 0      | 3     | 0     | 0    |
| Sign Control             | Free   | Free | Free   | Free  | Stop  | Stop |
| RT Channelized           | -      | None | -      | None  | -     | None |
| Storage Length           | 100    | -    | -      | -     | 0     | -    |
| Veh in Median Storage, # | -      | 0    | 0      | -     | 0     | -    |
| Grade, %                 | -      | 0    | 0      | -     | 0     | -    |
| Peak Hour Factor         | 92     | 92   | 92     | 92    | 92    | 92   |
| Heavy Vehicles, %        | 1      | 1    | 2      | 2     | 1     | 1    |
| Mvmt Flow                | 125    | 1136 | 793    | 33    | 43    | 82   |
| Major/Minor              |        |      |        |       |       |      |
| Major1                   | Major2 |      | Minor2 |       |       |      |
| Conflicting Flow All     | 829    | 0    | -      | 0     | 1631  | 416  |
| Stage 1                  | -      | -    | -      | -     | 813   | -    |
| Stage 2                  | -      | -    | -      | -     | 818   | -    |
| Critical Hdwy            | 4.12   | -    | -      | -     | 6.82  | 6.92 |
| Critical Hdwy Stg 1      | -      | -    | -      | -     | 5.82  | -    |
| Critical Hdwy Stg 2      | -      | -    | -      | -     | 5.82  | -    |
| Follow-up Hdwy           | 2.21   | -    | -      | -     | 3.51  | 3.31 |
| Pot Cap-1 Maneuver       | 805    | -    | -      | -     | 93    | 588  |
| Stage 1                  | -      | -    | -      | -     | 399   | -    |
| Stage 2                  | -      | -    | -      | -     | 397   | -    |
| Platoon blocked, %       | -      | -    | -      | -     | -     | -    |
| Mov Cap-1 Maneuver       | 805    | -    | -      | -     | 78    | 587  |
| Mov Cap-2 Maneuver       | -      | -    | -      | -     | 78    | -    |
| Stage 1                  | -      | -    | -      | -     | 398   | -    |
| Stage 2                  | -      | -    | -      | -     | 335   | -    |
| Approach                 |        |      |        |       |       |      |
| EB                       | WB     |      | SB     |       |       |      |
| HCM Control Delay, s     | 1      | 0    | -      | -     | 61    | -    |
| HCM LOS                  | -      | -    | -      | -     | F     | -    |
| Minor Lane/Major Mvmt    |        |      |        |       |       |      |
| EBL                      | EBT    | WBT  | WBR    | SBLn1 |       |      |
| Capacity (veh/h)         | 805    | -    | -      | -     | 180   | -    |
| HCM Lane V/C Ratio       | 0.155  | -    | -      | -     | 0.694 | -    |
| HCM Control Delay (s)    | 10.3   | -    | -      | -     | 61    | -    |
| HCM Lane LOS             | B      | -    | -      | -     | F     | -    |
| HCM 95th %tile Q(veh)    | 0.5    | -    | -      | -     | 4.2   | -    |

12239.00 :: Needham Street  
25: 1st Avenue/Riverside Community Care Driveway & Highland Avenue

2025 No Build Conditions  
Timing Plan: Weekday Morning

| Lane Group              | EBL   | EBT   | EBR   | WBL   | WBT   | WBR   | NBL   | NBT   | NBR   | SBL   | SBT   | SBR   | Ø1   | Ø5   |
|-------------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|------|------|
| Lane Configurations     | ↰     | ↰↱    | ↱     | ↰     | ↰↱    | ↱     | ↰     | ↰↱    | ↱     | ↰     | ↰↱    | ↱     |      |      |
| Traffic Volume (vph)    | 0     | 1180  | 630   | 5     | 795   | 15    | 245   | 0     | 80    | 0     | 0     | 15    |      |      |
| Future Volume (vph)     | 0     | 1180  | 630   | 5     | 795   | 15    | 245   | 0     | 80    | 0     | 0     | 15    |      |      |
| Ideal Flow (vphpl)      | 1900  | 1900  | 1900  | 1900  | 1900  | 1900  | 1900  | 1900  | 1900  | 1900  | 1900  | 1900  |      |      |
| Storage Length (ft)     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 200   | 0     | 0     | 0     |      |      |
| Storage Lanes           | 0     | 1     | 0     | 0     | 0     | 0     | 1     | 0     | 0     | 0     | 0     | 0     |      |      |
| Taper Length (ft)       | 25    | -     | -     | 25    | -     | -     | 25    | -     | -     | 25    | -     | -     |      |      |
| Satd. Flow (prot)       | 0     | 3574  | 1599  | 0     | 3494  | 0     | 1665  | 1563  | 0     | 0     | 1644  | 0     |      |      |
| Flt Permitted           | -     | -     | -     | -     | 0.948 | -     | 0.950 | 0.976 | -     | -     | -     | -     |      |      |
| Satd. Flow (perm)       | 0     | 3574  | 1562  | 0     | 3313  | 0     | 1665  | 1563  | 0     | 0     | 1644  | 0     |      |      |
| Right Turn on Red       | -     | Yes   | -     | -     | Yes   | -     | -     | Yes   | -     | -     | Yes   | -     |      |      |
| Satd. Flow (RTOR)       | -     | 685   | -     | -     | 2     | -     | -     | 96    | -     | -     | 113   | -     |      |      |
| Link Speed (mph)        | 30    | -     | -     | 30    | -     | -     | 30    | -     | -     | 30    | -     | -     |      |      |
| Link Distance (ft)      | 377   | -     | -     | 272   | -     | -     | 825   | -     | -     | 147   | -     | -     |      |      |
| Travel Time (s)         | 8.6   | -     | -     | 6.2   | -     | -     | 18.8  | -     | -     | 3.3   | -     | -     |      |      |
| Confl. Peds. (#/hr)     | -     | 1     | 1     | -     | -     | -     | -     | 6     | 6     | -     | -     | -     |      |      |
| Confl. Bikes (#/hr)     | -     | 1     | -     | -     | -     | -     | -     | -     | -     | -     | -     | -     |      |      |
| Peak Hour Factor        | 0.92  | 0.92  | 0.92  | 0.92  | 0.92  | 0.92  | 0.92  | 0.92  | 0.92  | 0.92  | 0.92  | 0.92  |      |      |
| Heavy Vehicles (%)      | 1%    | 1%    | 1%    | 3%    | 3%    | 3%    | 3%    | 3%    | 3%    | 0%    | 0%    | 0%    |      |      |
| Shared Lane Traffic (%) | -     | -     | -     | -     | -     | -     | 32%   | -     | -     | -     | -     | -     |      |      |
| Lane Group Flow (vph)   | 0     | 1283  | 685   | 0     | 885   | 0     | 181   | 172   | 0     | 0     | 16    | 0     |      |      |
| Turn Type               | NA    | pm+ov | Perm  | NA    | Split | NA    | NA    | NA    | NA    | NA    | NA    | NA    |      |      |
| Protected Phases        | 6     | 8     | 2     | 2     | 8     | 8     | 8     | 8     | 4     | 4     | 4     | 4     | 1    | 5    |
| Permitted Phases        | 6     | 2     | -     | -     | -     | -     | -     | -     | 4     | -     | -     | -     | -    | -    |
| Detector Phase          | 6     | 8     | 2     | 2     | 8     | 8     | 8     | 8     | 4     | 4     | 4     | 4     | -    | -    |
| Switch Phase            | -     | -     | -     | -     | -     | -     | -     | -     | -     | -     | -     | -     | -    | -    |
| Minimum Initial (s)     | 10.0  | 6.0   | 10.0  | 10.0  | 6.0   | 6.0   | 6.0   | 6.0   | 6.0   | 6.0   | 6.0   | 6.0   | 1.0  | 1.0  |
| Minimum Split (s)       | 25.0  | 12.0  | 16.0  | 16.0  | 12.0  | 12.0  | 29.0  | 29.0  | 29.0  | 29.0  | 29.0  | 29.0  | 3.0  | 3.0  |
| Total Split (s)         | 55.0  | 26.0  | 55.0  | 55.0  | 26.0  | 26.0  | 30.0  | 30.0  | 30.0  | 30.0  | 30.0  | 30.0  | 3.0  | 3.0  |
| Total Split (%)         | 48.2% | 22.8% | 48.2% | 48.2% | 22.8% | 22.8% | 26.3% | 26.3% | 26.3% | 26.3% | 26.3% | 26.3% | 3%   | 3%   |
| Yellow Time (s)         | 4.0   | 4.0   | 4.0   | 4.0   | 4.0   | 4.0   | 4.0   | 4.0   | 4.0   | 4.0   | 4.0   | 4.0   | 2.0  | 2.0  |
| All-Red Time (s)        | 1.0   | 2.0   | 1.0   | 1.0   | 2.0   | 2.0   | 2.0   | 2.0   | 2.0   | 2.0   | 2.0   | 2.0   | 0.0  | 0.0  |
| Lost Time Adjust (s)    | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | -    | -    |
| Total Lost Time (s)     | 5.0   | 6.0   | 5.0   | 5.0   | 6.0   | 6.0   | 6.0   | 6.0   | 6.0   | 6.0   | 6.0   | 6.0   | -    | -    |
| Lead/Lag                | Lag   | Yes   | Lag   | Lag   | Yes   | Yes   | -     | -     | -     | -     | -     | -     | Lead | Lead |
| Lead-Lag Optimize?      | Yes   | Yes   | Yes   | Yes   | Yes   | Yes   | -     | -     | -     | -     | -     | -     | Yes  | Yes  |
| Recall Mode             | Min   | None  | Min   | Min   | None  | None  | None  | None  | None  | None  | None  | None  | None | None |
| Act Effect Green (s)    | 31.9  | 46.2  | 32.2  | 32.2  | 15.5  | 15.5  | 15.5  | 15.5  | 15.5  | 15.5  | 15.5  | 15.5  | 9.1  | 9.1  |
| Actuated g/C Ratio      | 0.48  | 0.70  | 0.49  | 0.49  | 0.23  | 0.23  | 0.23  | 0.23  | 0.23  | 0.23  | 0.23  | 0.23  | 0.14 | 0.14 |
| v/c Ratio               | 0.74  | 0.52  | 0.55  | 0.46  | 0.39  | 0.39  | 0.39  | 0.39  | 0.39  | 0.39  | 0.39  | 0.39  | 0.05 | 0.05 |
| Control Delay           | 19.2  | 2.0   | 15.0  | 32.7  | 17.8  | 17.8  | 17.8  | 17.8  | 17.8  | 17.8  | 17.8  | 17.8  | 0.3  | 0.3  |
| Queue Delay             | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0  | 0.0  |
| Total Delay             | 19.2  | 2.0   | 15.0  | 32.7  | 17.8  | 17.8  | 17.8  | 17.8  | 17.8  | 17.8  | 17.8  | 17.8  | 0.3  | 0.3  |
| LOS                     | B     | A     | B     | B     | C     | B     | B     | B     | B     | B     | B     | B     | A    | A    |
| Approach Delay          | 13.2  | -     | 15.0  | -     | 25.4  | -     | -     | -     | -     | -     | -     | -     | 0.3  | 0.3  |
| Approach LOS            | B     | -     | B     | -     | C     | -     | -     | -     | -     | -     | -     | -     | A    | A    |
| Queue Length 50th (ft)  | 145   | 0     | 86    | 48    | 18    | 18    | 18    | 18    | 18    | 18    | 18    | 18    | 0    | 0    |
| Queue Length 95th (ft)  | 511   | 33    | 300   | 209   | 124   | 124   | 124   | 124   | 124   | 124   | 124   | 124   | 0    | 0    |
| Internal Link Dist (ft) | 297   | -     | 192   | -     | 745   | -     | -     | -     | -     | -     | -     | -     | 67   | 67   |
| Turn Bay Length (ft)    | -     | -     | -     | -     | -     | -     | -     | -     | -     | -     | -     | -     | -    | -    |
| Base Capacity (vph)     | 2846  | 1381  | 2656  | 596   | 621   | 621   | 621   | 621   | 621   | 621   | 621   | 621   | 770  | 770  |
| Starvation Cap Reductn  | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0    | 0    |
| Spillback Cap Reductn   | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0    | 0    |
| Storage Cap Reductn     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0    | 0    |
| Reduced v/c Ratio       | 0.45  | 0.50  | 0.33  | 0.30  | 0.28  | 0.28  | 0.28  | 0.28  | 0.28  | 0.28  | 0.28  | 0.28  | 0.02 | 0.02 |

| Intersection Summary                    |                        |
|-----------------------------------------|------------------------|
| Area Type:                              | Other                  |
| Cycle Length: 114                       |                        |
| Actuated Cycle Length: 66               |                        |
| Natural Cycle: 80                       |                        |
| Control Type: Actuated-Uncoordinated    |                        |
| Maximum v/c Ratio: 0.74                 |                        |
| Intersection Signal Delay: 15.0         | Intersection LOS: B    |
| Intersection Capacity Utilization 80.9% | ICU Level of Service D |
| Analysis Period (min) 15                |                        |



12239.00 :: Needham Street  
26: I-95 NB Ramps & Highland Avenue

2025 No Build Conditions  
Timing Plan: Weekday Morning

| Intersection                                                                                                         |        |        |       |        |      |        |      |      |       |      |      |       |
|----------------------------------------------------------------------------------------------------------------------|--------|--------|-------|--------|------|--------|------|------|-------|------|------|-------|
| Int Delay, s/veh                                                                                                     | 11.4   |        |       |        |      |        |      |      |       |      |      |       |
| Movement                                                                                                             | EBL    | EBT    | EBR   | WBL    | WBT  | WBR    | NBL  | NBT  | NBR   | SBL  | SBT  | SBR   |
| Lane Configurations                                                                                                  |        | ↕↕     | ↗     |        | ↕↕   |        |      |      | ↗     |      | ↖    | ↗     |
| Traffic Vol, veh/h                                                                                                   | 0      | 1485   | 460   | 0      | 685  | 370    | 0    | 0    | 325   | 0    | 0    | 95    |
| Future Vol, veh/h                                                                                                    | 0      | 1485   | 460   | 0      | 685  | 370    | 0    | 0    | 325   | 0    | 0    | 95    |
| Conflicting Peds, #/hr                                                                                               | 0      | 0      | 2     | 2      | 0    | 0      | 0    | 0    | 2     | 0    | 0    | 0     |
| Sign Control                                                                                                         | Free   | Free   | Free  | Free   | Free | Free   | Stop | Stop | Stop  | Stop | Stop | Stop  |
| RT Channelized                                                                                                       | -      | -      | Yield | -      | -    | Yield  | -    | -    | Yield | -    | -    | Yield |
| Storage Length                                                                                                       | -      | -      | 0     | -      | -    | -      | -    | -    | 0     | -    | -    | 0     |
| Veh in Median Storage, #                                                                                             | -      | 0      | -     | -      | 0    | -      | -    | 0    | -     | -    | 0    | -     |
| Grade, %                                                                                                             | -      | 0      | -     | -      | 0    | -      | -    | 0    | -     | -    | 0    | -     |
| Peak Hour Factor                                                                                                     | 92     | 92     | 92    | 92     | 92   | 92     | 92   | 92   | 92    | 92   | 92   | 92    |
| Heavy Vehicles, %                                                                                                    | 0      | 0      | 0     | 3      | 3    | 3      | 2    | 2    | 2     | 2    | 2    | 2     |
| Mvmt Flow                                                                                                            | 0      | 1614   | 500   | 0      | 745  | 402    | 0    | 0    | 353   | 0    | 0    | 103   |
|                                                                                                                      |        |        |       |        |      |        |      |      |       |      |      |       |
| Major/Minor                                                                                                          | Major1 | Major2 |       | Minor1 |      | Minor2 |      |      |       |      |      |       |
| Conflicting Flow All                                                                                                 | -      | 0      | 0     | -      | -    | 0      | -    | -    | 811   | -    | -    | 372   |
| Stage 1                                                                                                              | -      | -      | -     | -      | -    | -      | -    | -    | -     | -    | -    | -     |
| Stage 2                                                                                                              | -      | -      | -     | -      | -    | -      | -    | -    | -     | -    | -    | -     |
| Critical Hdwy                                                                                                        | -      | -      | -     | -      | -    | -      | -    | -    | 6.94  | -    | -    | 6.94  |
| Critical Hdwy Stg 1                                                                                                  | -      | -      | -     | -      | -    | -      | -    | -    | -     | -    | -    | -     |
| Critical Hdwy Stg 2                                                                                                  | -      | -      | -     | -      | -    | -      | -    | -    | -     | -    | -    | -     |
| Follow-up Hdwy                                                                                                       | -      | -      | -     | -      | -    | -      | -    | -    | 3.32  | -    | -    | 3.32  |
| Pot Cap-1 Maneuver                                                                                                   | 0      | -      | -     | 0      | -    | 0      | 0    | 0    | ~ 322 | 0    | 0    | 625   |
| Stage 1                                                                                                              | 0      | -      | -     | 0      | -    | 0      | 0    | 0    | -     | 0    | 0    | -     |
| Stage 2                                                                                                              | 0      | -      | -     | 0      | -    | 0      | 0    | 0    | -     | 0    | 0    | -     |
| Platoon blocked, %                                                                                                   | -      | -      | -     | -      | -    | -      | -    | -    | -     | -    | -    | -     |
| Mov Cap-1 Maneuver                                                                                                   | -      | -      | -     | -      | -    | -      | -    | -    | ~ 321 | -    | -    | 625   |
| Mov Cap-2 Maneuver                                                                                                   | -      | -      | -     | -      | -    | -      | -    | -    | -     | -    | -    | -     |
| Stage 1                                                                                                              | -      | -      | -     | -      | -    | -      | -    | -    | -     | -    | -    | -     |
| Stage 2                                                                                                              | -      | -      | -     | -      | -    | -      | -    | -    | -     | -    | -    | -     |
|                                                                                                                      |        |        |       |        |      |        |      |      |       |      |      |       |
| Approach                                                                                                             | EB     | WB     |       | NB     |      | SB     |      |      |       |      |      |       |
| HCM Control Delay, s                                                                                                 | 0      | 0      |       | 116.7  |      | 11.9   |      |      |       |      |      |       |
| HCM LOS                                                                                                              |        |        |       | F      |      | B      |      |      |       |      |      |       |
|                                                                                                                      |        |        |       |        |      |        |      |      |       |      |      |       |
| Minor Lane/Major Mvmt                                                                                                | NBLn1  | EBT    | EBR   | WBT    | WBR  | SBLn1  |      |      |       |      |      |       |
| Capacity (veh/h)                                                                                                     | 321    | -      | -     | -      | -    | 625    |      |      |       |      |      |       |
| HCM Lane V/C Ratio                                                                                                   | 1.101  | -      | -     | -      | -    | 0.165  |      |      |       |      |      |       |
| HCM Control Delay (s)                                                                                                | 116.7  | -      | -     | -      | -    | 11.9   |      |      |       |      |      |       |
| HCM Lane LOS                                                                                                         | F      | -      | -     | -      | -    | B      |      |      |       |      |      |       |
| HCM 95th %tile Q(veh)                                                                                                | 13.7   | -      | -     | -      | -    | 0.6    |      |      |       |      |      |       |
|                                                                                                                      |        |        |       |        |      |        |      |      |       |      |      |       |
| Notes                                                                                                                |        |        |       |        |      |        |      |      |       |      |      |       |
| ~: Volume exceeds capacity    \$: Delay exceeds 300s    +: Computation Not Defined    *: All major volume in platoon |        |        |       |        |      |        |      |      |       |      |      |       |

12239.00 :: Needham Street  
27: I-95 SB Ramps & Highland Avenue

2025 No Build Conditions  
Timing Plan: Weekday Morning

| Intersection                                                                                                          |        |        |       |        |      |        |      |      |       |      |      |       |
|-----------------------------------------------------------------------------------------------------------------------|--------|--------|-------|--------|------|--------|------|------|-------|------|------|-------|
| Int Delay, s/veh                                                                                                      | 146.7  |        |       |        |      |        |      |      |       |      |      |       |
| Movement                                                                                                              | EBL    | EBT    | EBR   | WBL    | WBT  | WBR    | NBL  | NBT  | NBR   | SBL  | SBT  | SBR   |
| Lane Configurations                                                                                                   |        | ↕↕     |       |        | ↕↕   | ↗      |      |      | ↗     |      | ↖    | ↗     |
| Traffic Vol, veh/h                                                                                                    | 0      | 1035   | 120   | 0      | 500  | 280    | 0    | 0    | 910   | 0    | 0    | 550   |
| Future Vol, veh/h                                                                                                     | 0      | 1035   | 120   | 0      | 500  | 280    | 0    | 0    | 910   | 0    | 0    | 550   |
| Conflicting Peds, #/hr                                                                                                | 0      | 0      | 1     | 1      | 0    | 0      | 0    | 0    | 1     | 0    | 0    | 0     |
| Sign Control                                                                                                          | Free   | Free   | Free  | Free   | Free | Free   | Stop | Stop | Stop  | Stop | Stop | Stop  |
| RT Channelized                                                                                                        | -      | -      | Yield | -      | -    | Yield  | -    | -    | Yield | -    | -    | Yield |
| Storage Length                                                                                                        | -      | -      | -     | -      | -    | 0      | -    | -    | 0     | -    | -    | 0     |
| Veh in Median Storage, #                                                                                              | -      | 0      | -     | -      | 0    | -      | -    | 0    | -     | -    | 0    | -     |
| Grade, %                                                                                                              | -      | 0      | -     | -      | 0    | -      | -    | 0    | -     | -    | 0    | -     |
| Peak Hour Factor                                                                                                      | 92     | 92     | 92    | 92     | 92   | 92     | 92   | 92   | 92    | 92   | 92   | 92    |
| Heavy Vehicles, %                                                                                                     | 1      | 1      | 1     | 3      | 3    | 3      | 2    | 2    | 2     | 2    | 2    | 2     |
| Mvmt Flow                                                                                                             | 0      | 1125   | 130   | 0      | 543  | 304    | 0    | 0    | 989   | 0    | 0    | 598   |
| Major/Minor                                                                                                           | Major1 | Major2 |       | Minor1 |      | Minor2 |      |      |       |      |      |       |
| Conflicting Flow All                                                                                                  | -      | 0      | 0     | -      | -    | 0      | -    | -    | 565   | -    | -    | 272   |
| Stage 1                                                                                                               | -      | -      | -     | -      | -    | -      | -    | -    | -     | -    | -    | -     |
| Stage 2                                                                                                               | -      | -      | -     | -      | -    | -      | -    | -    | -     | -    | -    | -     |
| Critical Hdwy                                                                                                         | -      | -      | -     | -      | -    | -      | -    | -    | 6.94  | -    | -    | 6.94  |
| Critical Hdwy Stp 1                                                                                                   | -      | -      | -     | -      | -    | -      | -    | -    | -     | -    | -    | -     |
| Critical Hdwy Stp 2                                                                                                   | -      | -      | -     | -      | -    | -      | -    | -    | -     | -    | -    | -     |
| Follow-up Hdwy                                                                                                        | -      | -      | -     | -      | -    | -      | -    | -    | 3.32  | -    | -    | 3.32  |
| Pot Cap-1 Maneuver                                                                                                    | 0      | -      | -     | 0      | -    | -      | 0    | 0    | ~ 468 | 0    | 0    | 726   |
| Stage 1                                                                                                               | 0      | -      | -     | 0      | -    | -      | 0    | 0    | -     | 0    | 0    | -     |
| Stage 2                                                                                                               | 0      | -      | -     | 0      | -    | -      | 0    | 0    | -     | 0    | 0    | -     |
| Platoon blocked, %                                                                                                    | -      | -      | -     | -      | -    | -      | -    | -    | -     | -    | -    | -     |
| Mov Cap-1 Maneuver                                                                                                    | -      | -      | -     | -      | -    | -      | -    | -    | ~ 467 | -    | -    | 726   |
| Mov Cap-2 Maneuver                                                                                                    | -      | -      | -     | -      | -    | -      | -    | -    | -     | -    | -    | -     |
| Stage 1                                                                                                               | -      | -      | -     | -      | -    | -      | -    | -    | -     | -    | -    | -     |
| Stage 2                                                                                                               | -      | -      | -     | -      | -    | -      | -    | -    | -     | -    | -    | -     |
| Approach                                                                                                              | EB     | WB     |       | NB     |      | SB     |      |      |       |      |      |       |
| HCM Control Delay, s                                                                                                  | 0      | 0      |       | \$ 530 |      | 28.7   |      |      |       |      |      |       |
| HCM LOS                                                                                                               |        |        |       | F      |      | D      |      |      |       |      |      |       |
| Minor Lane/Major Mvmt                                                                                                 | NBLn1  | EBT    | EBR   | WBT    | WBR  | SBLn1  |      |      |       |      |      |       |
| Capacity (veh/h)                                                                                                      | 467    | -      | -     | -      | -    | 726    |      |      |       |      |      |       |
| HCM Lane V/C Ratio                                                                                                    | 2.118  | -      | -     | -      | -    | 0.823  |      |      |       |      |      |       |
| HCM Control Delay (s)                                                                                                 | \$ 530 | -      | -     | -      | -    | 28.7   |      |      |       |      |      |       |
| HCM Lane LOS                                                                                                          | F      | -      | -     | -      | -    | D      |      |      |       |      |      |       |
| HCM 95th %ile Q(veh)                                                                                                  | 70.5   | -      | -     | -      | -    | 9      |      |      |       |      |      |       |
| Notes                                                                                                                 |        |        |       |        |      |        |      |      |       |      |      |       |
| --: Volume exceeds capacity    \$: Delay exceeds 300s    +: Computation Not Defined    *: All major volume in platoon |        |        |       |        |      |        |      |      |       |      |      |       |

12239.00 :: Needham Street  
1: Chestnut Street & Route 9 WB Access Road

2025 No Build Conditions  
Timing Plan: Weekday Evening

| Intersection               |       |       |       |       |      |      |      |      |      |       |      |      |
|----------------------------|-------|-------|-------|-------|------|------|------|------|------|-------|------|------|
| Intersection Delay, s/veh  | 101.1 |       |       |       |      |      |      |      |      |       |      |      |
| Intersection LOS           | F     |       |       |       |      |      |      |      |      |       |      |      |
| Movement                   | EBL   | EBT   | EBR   | WBL   | WBT  | WBR  | NBL  | NBT  | NBR  | SBL   | SBT  | SBR  |
| Lane Configurations        |       | ↔     |       |       | ↔    |      |      | ↔    |      |       | ↔    |      |
| Traffic Vol, veh/h         | 120   | 1     | 30    | 120   | 30   | 30   | 60   | 495  | 1    | 1     | 425  | 230  |
| Future Vol, veh/h          | 120   | 1     | 30    | 120   | 30   | 30   | 60   | 495  | 1    | 1     | 425  | 230  |
| Peak Hour Factor           | 0.92  | 0.92  | 0.92  | 0.92  | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92  | 0.92 | 0.92 |
| Heavy Vehicles, %          | 0     | 0     | 0     | 0     | 0    | 0    | 0    | 0    | 0    | 0     | 0    | 0    |
| Mvmt Flow                  | 130   | 1     | 33    | 130   | 33   | 33   | 65   | 538  | 1    | 1     | 462  | 250  |
| Number of Lanes            | 0     | 1     | 0     | 0     | 1    | 0    | 0    | 1    | 0    | 0     | 1    | 0    |
| Approach                   | EB    |       |       | WB    |      |      | NB   |      |      | SB    |      |      |
| Opposing Approach          | WB    |       |       | EB    |      |      | SB   |      |      | NB    |      |      |
| Opposing Lanes             | 1     |       |       | 1     |      |      | 1    |      |      | 1     |      |      |
| Conflicting Approach Left  | SB    |       |       | NB    |      |      | EB   |      |      | WB    |      |      |
| Conflicting Lanes Left     | 1     |       |       | 1     |      |      | 1    |      |      | 1     |      |      |
| Conflicting Approach Right | NB    |       |       | SB    |      |      | WB   |      |      | EB    |      |      |
| Conflicting Lanes Right    | 1     |       |       | 1     |      |      | 1    |      |      | 1     |      |      |
| HCM Control Delay          | 17.1  |       |       | 18.3  |      |      | 94.8 |      |      | 148.4 |      |      |
| HCM LOS                    | C     |       |       | C     |      |      | F    |      |      | F     |      |      |
| Lane                       | NBLn1 | EBLn1 | WBLn1 | SBLn1 |      |      |      |      |      |       |      |      |
| Vol Left, %                | 11%   | 79%   | 67%   | 0%    |      |      |      |      |      |       |      |      |
| Vol Thru, %                | 89%   | 1%    | 17%   | 65%   |      |      |      |      |      |       |      |      |
| Vol Right, %               | 0%    | 20%   | 17%   | 35%   |      |      |      |      |      |       |      |      |
| Sign Control               | Stop  | Stop  | Stop  | Stop  |      |      |      |      |      |       |      |      |
| Traffic Vol by Lane        | 556   | 151   | 180   | 656   |      |      |      |      |      |       |      |      |
| LT Vol                     | 60    | 120   | 120   | 1     |      |      |      |      |      |       |      |      |
| Through Vol                | 495   | 1     | 30    | 425   |      |      |      |      |      |       |      |      |
| RT Vol                     | 1     | 30    | 30    | 230   |      |      |      |      |      |       |      |      |
| Lane Flow Rate             | 604   | 164   | 196   | 713   |      |      |      |      |      |       |      |      |
| Geometry Grp               | 1     | 1     | 1     | 1     |      |      |      |      |      |       |      |      |
| Degree of Util (X)         | 1.097 | 0.37  | 0.432 | 1.249 |      |      |      |      |      |       |      |      |
| Departure Headway (Hd)     | 7.051 | 8.962 | 8.759 | 6.611 |      |      |      |      |      |       |      |      |
| Convergence, Y/N           | Yes   | Yes   | Yes   | Yes   |      |      |      |      |      |       |      |      |
| Cap                        | 520   | 404   | 415   | 556   |      |      |      |      |      |       |      |      |
| Service Time               | 5.051 | 6.962 | 6.759 | 4.611 |      |      |      |      |      |       |      |      |
| HCM Lane V/C Ratio         | 1.162 | 0.406 | 0.472 | 1.282 |      |      |      |      |      |       |      |      |
| HCM Control Delay          | 94.8  | 17.1  | 18.3  | 148.4 |      |      |      |      |      |       |      |      |
| HCM Lane LOS               | F     | C     | C     | F     |      |      |      |      |      |       |      |      |
| HCM 95th-tile Q            | 17.9  | 1.7   | 2.1   | 26.6  |      |      |      |      |      |       |      |      |

12239.00 :: Needham Street  
2: Chestnut Street & Route 9 EB Access Road

2025 No Build Conditions  
Timing Plan: Weekday Evening

| Intersection               |       |       |       |       |      |      |      |      |      |      |      |      |
|----------------------------|-------|-------|-------|-------|------|------|------|------|------|------|------|------|
| Intersection Delay, s/veh  | 54.2  |       |       |       |      |      |      |      |      |      |      |      |
| Intersection LOS           | F     |       |       |       |      |      |      |      |      |      |      |      |
| Movement                   | EBL   | EBT   | EBR   | WBL   | WBT  | WBR  | NBL  | NBT  | NBR  | SBL  | SBT  | SBR  |
| Lane Configurations        |       | ↕     |       |       | ↕    |      |      | ↕    |      |      | ↕    |      |
| Traffic Vol, veh/h         | 180   | 155   | 10    | 1     | 2    | 20   | 2    | 355  | 30   | 100  | 475  | 2    |
| Future Vol, veh/h          | 180   | 155   | 10    | 1     | 2    | 20   | 2    | 355  | 30   | 100  | 475  | 2    |
| Peak Hour Factor           | 0.92  | 0.92  | 0.92  | 0.92  | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Heavy Vehicles, %          | 0     | 0     | 0     | 0     | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    |
| Mvmt Flow                  | 196   | 168   | 11    | 1     | 2    | 22   | 2    | 386  | 33   | 109  | 516  | 2    |
| Number of Lanes            | 0     | 1     | 0     | 0     | 1    | 0    | 0    | 1    | 0    | 0    | 1    | 0    |
| Approach                   | EB    |       |       | WB    |      |      | NB   |      |      | SB   |      |      |
| Opposing Approach          | WB    |       |       | EB    |      |      | SB   |      |      | NB   |      |      |
| Opposing Lanes             | 1     |       |       | 1     |      |      | 1    |      |      | 1    |      |      |
| Conflicting Approach Left  | SB    |       |       | NB    |      |      | EB   |      |      | WB   |      |      |
| Conflicting Lanes Left     | 1     |       |       | 1     |      |      | 1    |      |      | 1    |      |      |
| Conflicting Approach Right | NB    |       |       | SB    |      |      | WB   |      |      | EB   |      |      |
| Conflicting Lanes Right    | 1     |       |       | 1     |      |      | 1    |      |      | 1    |      |      |
| HCM Control Delay          | 26    |       |       | 11.6  |      |      | 26.4 |      |      | 91.4 |      |      |
| HCM LOS                    | D     |       |       | B     |      |      | D    |      |      | F    |      |      |
| Lane                       | NBLn1 | EBLn1 | WBLn1 | SBLn1 |      |      |      |      |      |      |      |      |
| Vol Left, %                | 1%    | 52%   | 4%    | 17%   |      |      |      |      |      |      |      |      |
| Vol Thru, %                | 92%   | 45%   | 9%    | 82%   |      |      |      |      |      |      |      |      |
| Vol Right, %               | 8%    | 3%    | 87%   | 0%    |      |      |      |      |      |      |      |      |
| Sign Control               | Stop  | Stop  | Stop  | Stop  |      |      |      |      |      |      |      |      |
| Traffic Vol by Lane        | 387   | 345   | 23    | 577   |      |      |      |      |      |      |      |      |
| LT Vol                     | 2     | 180   | 1     | 100   |      |      |      |      |      |      |      |      |
| Through Vol                | 355   | 155   | 2     | 475   |      |      |      |      |      |      |      |      |
| RT Vol                     | 30    | 10    | 20    | 2     |      |      |      |      |      |      |      |      |
| Lane Flow Rate             | 421   | 375   | 25    | 627   |      |      |      |      |      |      |      |      |
| Geometry Grp               | 1     | 1     | 1     | 1     |      |      |      |      |      |      |      |      |
| Degree of Util (X)         | 0.743 | 0.713 | 0.054 | 1.098 |      |      |      |      |      |      |      |      |
| Departure Headway (Hd)     | 6.653 | 7.166 | 8.134 | 6.303 |      |      |      |      |      |      |      |      |
| Convergence, Y/N           | Yes   | Yes   | Yes   | Yes   |      |      |      |      |      |      |      |      |
| Cap                        | 547   | 506   | 443   | 583   |      |      |      |      |      |      |      |      |
| Service Time               | 4.653 | 5.166 | 6.134 | 4.305 |      |      |      |      |      |      |      |      |
| HCM Lane V/C Ratio         | 0.77  | 0.741 | 0.056 | 1.075 |      |      |      |      |      |      |      |      |
| HCM Control Delay          | 26.4  | 26    | 11.6  | 91.4  |      |      |      |      |      |      |      |      |
| HCM Lane LOS               | D     | D     | B     | F     |      |      |      |      |      |      |      |      |
| HCM 95th-tile Q            | 6.4   | 5.7   | 0.2   | 19.2  |      |      |      |      |      |      |      |      |

12239.00 :: Needham Street  
3: Chestnut Street & Elliot Street

2025 No Build Conditions  
Timing Plan: Weekday Evening

| Lane Group              | EBL   | EBT   | EBR  | WBL   | WBT   | WBR  | NBL   | NBT   | NBR  | SBL   | SBT   | SBR  | Ø3   |
|-------------------------|-------|-------|------|-------|-------|------|-------|-------|------|-------|-------|------|------|
| Lane Configurations     | ↔     |       |      |       | ↔     |      |       | ↔     |      | ↔     | ↔     |      |      |
| Traffic Volume (vph)    | 165   | 245   | 55   | 10    | 195   | 45   | 90    | 250   | 5    | 60    | 305   | 315  |      |
| Future Volume (vph)     | 165   | 245   | 55   | 10    | 195   | 45   | 90    | 250   | 5    | 60    | 305   | 315  |      |
| Ideal Flow (vphpl)      | 1900  | 1900  | 1900 | 1900  | 1900  | 1900 | 1900  | 1900  | 1900 | 1900  | 1900  | 1900 |      |
| Satd. Flow (prot)       | 0     | 1833  | 0    | 0     | 1843  | 0    | 0     | 1871  | 0    | 0     | 1755  | 0    |      |
| Fit Permitted           | 0     | 0.685 |      |       | 0.979 |      |       | 0.646 |      |       | 0.933 |      |      |
| Satd. Flow (perm)       | 0     | 1276  | 0    | 0     | 1808  | 0    | 0     | 1224  | 0    | 0     | 1645  | 0    |      |
| Right Turn on Red       | Yes   |       |      |       | Yes   |      |       | Yes   |      |       | Yes   |      |      |
| Satd. Flow (RTOR)       | 6     |       |      |       | 10    |      |       | 1     |      |       | 53    |      |      |
| Link Speed (mph)        | 30    |       |      |       | 30    |      |       | 30    |      |       | 30    |      |      |
| Link Distance (ft)      | 764   |       |      |       | 972   |      |       | 2055  |      |       | 1553  |      |      |
| Travel Time (s)         | 17.4  |       |      |       | 22.1  |      |       | 46.7  |      |       | 35.3  |      |      |
| Confl. Peds. (#/hr)     | 2     |       | 2    | 2     |       | 2    | 3     |       | 5    | 5     |       | 3    |      |
| Peak Hour Factor        | 0.92  | 0.92  | 0.92 | 0.92  | 0.92  | 0.92 | 0.92  | 0.92  | 0.92 | 0.92  | 0.92  | 0.92 |      |
| Heavy Vehicles (%)      | 0%    | 0%    | 0%   | 0%    | 0%    | 0%   | 0%    | 0%    | 0%   | 0%    | 0%    | 0%   |      |
| Shared Lane Traffic (%) |       |       |      |       |       |      |       |       |      |       |       |      |      |
| Lane Group Flow (vph)   | 0     | 505   | 0    | 0     | 272   | 0    | 0     | 375   | 0    | 0     | 739   | 0    |      |
| Turn Type               | Perm  | NA    |      |       | Perm  | NA   |       | Perm  | NA   |       | Perm  | NA   |      |
| Protected Phases        |       |       |      |       |       |      |       |       |      |       |       |      |      |
| Permitted Phases        | 1     | 1     |      | 1     | 1     |      | 2     | 2     |      | 2     | 2     |      | 3    |
| Detector Phase          | 1     | 1     |      | 1     | 1     |      | 2     | 2     |      | 2     | 2     |      |      |
| Switch Phase            |       |       |      |       |       |      |       |       |      |       |       |      |      |
| Minimum Initial (s)     | 6.0   | 6.0   |      | 6.0   | 6.0   |      | 6.0   | 6.0   |      | 6.0   | 6.0   |      | 4.0  |
| Minimum Split (s)       | 11.0  | 11.0  |      | 11.0  | 11.0  |      | 11.0  | 11.0  |      | 11.0  | 11.0  |      | 19.0 |
| Total Split (s)         | 35.0  | 35.0  |      | 35.0  | 35.0  |      | 55.0  | 55.0  |      | 55.0  | 55.0  |      | 19.0 |
| Total Split (%)         | 32.1% | 32.1% |      | 32.1% | 32.1% |      | 50.5% | 50.5% |      | 50.5% | 50.5% |      | 17%  |
| Yellow Time (s)         | 3.0   | 3.0   |      | 3.0   | 3.0   |      | 3.0   | 3.0   |      | 3.0   | 3.0   |      | 3.0  |
| All-Red Time (s)        | 2.0   | 2.0   |      | 2.0   | 2.0   |      | 2.0   | 2.0   |      | 2.0   | 2.0   |      | 1.0  |
| Lost Time Adjust (s)    | 0.0   |       |      |       | 0.0   |      |       | 0.0   |      |       | 0.0   |      |      |
| Total Lost Time (s)     | 5.0   |       |      |       | 5.0   |      |       | 5.0   |      |       | 5.0   |      |      |
| Lead/Lag                | Lead  | Lead  |      | Lead  | Lead  |      | Lag   | Lag   |      | Lag   | Lag   |      |      |
| Lead-Lag Optimize?      |       |       |      |       |       |      |       |       |      |       |       |      |      |
| Recall Mode             | None  | None  |      | None  | None  |      | None  | None  |      | None  | None  |      | None |
| Act Effect Green (s)    | 30.6  |       |      |       | 30.6  |      |       | 44.1  |      |       | 44.1  |      |      |
| Actuated g/C Ratio      | 0.35  |       |      |       | 0.35  |      |       | 0.50  |      |       | 0.50  |      |      |
| v/c Ratio               | 1.13  |       |      |       | 0.43  |      |       | 0.61  |      |       | 0.87  |      |      |
| Control Delay           | 113.6 |       |      |       | 26.7  |      |       | 21.9  |      |       | 31.2  |      |      |
| Queue Delay             | 0.0   |       |      |       | 0.0   |      |       | 0.0   |      |       | 0.0   |      |      |
| Total Delay             | 113.6 |       |      |       | 26.7  |      |       | 21.9  |      |       | 31.2  |      |      |
| LOS                     | F     |       |      |       | C     |      |       | C     |      |       | C     |      |      |
| Approach Delay          | 113.6 |       |      |       | 26.7  |      |       | 21.9  |      |       | 31.2  |      |      |
| Approach LOS            | F     |       |      |       | C     |      |       | C     |      |       | C     |      |      |
| Queue Length 50th (ft)  | ~329  |       |      |       | 110   |      |       | 128   |      |       | 290   |      |      |
| Queue Length 95th (ft)  | #686  |       |      |       | 241   |      |       | 313   |      |       | #717  |      |      |
| Internal Link Dist (ft) | 684   |       |      |       | 892   |      |       | 1975  |      |       | 1473  |      |      |
| Turn Bay Length (ft)    |       |       |      |       |       |      |       |       |      |       |       |      |      |
| Base Capacity (vph)     | 447   |       |      |       | 635   |      |       | 709   |      |       | 975   |      |      |
| Starvation Cap Reductn  | 0     |       |      |       | 0     |      |       | 0     |      |       | 0     |      |      |
| Spillback Cap Reductn   | 0     |       |      |       | 0     |      |       | 0     |      |       | 0     |      |      |
| Storage Cap Reductn     | 0     |       |      |       | 0     |      |       | 0     |      |       | 0     |      |      |
| Reduced v/c Ratio       | 1.13  |       |      |       | 0.43  |      |       | 0.53  |      |       | 0.76  |      |      |

Intersection Summary

|                                                             |                                                               |                        |
|-------------------------------------------------------------|---------------------------------------------------------------|------------------------|
| Area Type:                                                  | Other                                                         |                        |
| Cycle Length:                                               | 109                                                           |                        |
| Actuated Cycle Length:                                      | 87.9                                                          |                        |
| Natural Cycle:                                              | 150                                                           |                        |
| Control Type:                                               | Actuated-Uncoordinated                                        |                        |
| Maximum v/c Ratio:                                          | 1.13                                                          |                        |
| Intersection Signal Delay:                                  | 50.7                                                          | Intersection LOS: D    |
| Intersection Capacity Utilization:                          | 93.4%                                                         | ICU Level of Service F |
| Analysis Period (min)                                       | 15                                                            |                        |
| ~ Volume exceeds capacity, queue is theoretically infinite. |                                                               |                        |
| Queue shown is maximum after two cycles.                    |                                                               |                        |
| #                                                           | 95th percentile volume exceeds capacity, queue may be longer. |                        |
| Queue shown is maximum after two cycles.                    |                                                               |                        |

Splits and Phases: 3: Chestnut Street & Elliot Street



Lanes, Volumes, Timings  
VHB/MSD

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07/03/2018

12239.00 :: Needham Street  
4: Oak Street & Chestnut Street

2025 No Build Conditions  
Timing Plan: Weekday Evening

| Lane Group              | EBL   | EBT   | EBR  | WBL   | WBT   | WBR  | NBL   | NBT   | NBR  | SBL   | SBT   | SBR  | Ø3   |
|-------------------------|-------|-------|------|-------|-------|------|-------|-------|------|-------|-------|------|------|
| Lane Configurations     | ↔     |       |      |       | ↔     |      |       | ↔     |      | ↔     | ↔     |      |      |
| Traffic Volume (vph)    | 20    | 15    | 260  | 35    | 25    | 5    | 310   | 110   | 15   | 5     | 135   | 20   |      |
| Future Volume (vph)     | 20    | 15    | 260  | 35    | 25    | 5    | 310   | 110   | 15   | 5     | 135   | 20   |      |
| Ideal Flow (vphpl)      | 1900  | 1900  | 1900 | 1900  | 1900  | 1900 | 1900  | 1900  | 1900 | 1900  | 1900  | 1900 |      |
| Satd. Flow (prot)       | 0     | 1633  | 0    | 0     | 1829  | 0    | 0     | 1807  | 0    | 0     | 1841  | 0    |      |
| Fit Permitted           | 0     | 0.973 |      |       | 0.451 |      |       | 0.682 |      |       | 0.988 |      |      |
| Satd. Flow (perm)       | 0     | 1593  | 0    | 0     | 846   | 0    | 0     | 1271  | 0    | 0     | 1821  | 0    |      |
| Right Turn on Red       | Yes   |       |      |       | Yes   |      |       | Yes   |      |       | Yes   |      |      |
| Satd. Flow (RTOR)       | 283   |       |      |       | 4     |      |       | 2     |      |       | 8     |      |      |
| Link Speed (mph)        | 30    |       |      |       | 30    |      |       | 30    |      |       | 30    |      |      |
| Link Distance (ft)      | 2055  |       |      |       | 492   |      |       | 226   |      |       | 762   |      |      |
| Travel Time (s)         | 46.7  |       |      |       | 11.2  |      |       | 5.1   |      |       | 17.3  |      |      |
| Confl. Peds. (#/hr)     | 2     |       | 3    | 3     |       | 4    |       |       | 4    | 4     |       | 4    |      |
| Peak Hour Factor        | 0.92  | 0.92  | 0.92 | 0.92  | 0.92  | 0.92 | 0.92  | 0.92  | 0.92 | 0.92  | 0.92  | 0.92 |      |
| Heavy Vehicles (%)      | 0%    | 0%    | 0%   | 0%    | 0%    | 0%   | 1%    | 1%    | 1%   | 1%    | 1%    | 1%   |      |
| Shared Lane Traffic (%) |       |       |      |       |       |      |       |       |      |       |       |      |      |
| Lane Group Flow (vph)   | 0     | 321   | 0    | 0     | 70    | 0    | 0     | 473   | 0    | 0     | 174   | 0    |      |
| Turn Type               | Perm  | NA    |      |       | Perm  | NA   |       | Perm  | NA   |       | Perm  | NA   |      |
| Protected Phases        |       |       |      |       |       |      |       |       |      |       |       |      |      |
| Permitted Phases        | 1     | 1     |      | 1     | 1     |      | 2     | 2     |      | 2     | 2     |      | 3    |
| Detector Phase          | 1     | 1     |      | 1     | 1     |      | 2     | 2     |      | 2     | 2     |      |      |
| Switch Phase            |       |       |      |       |       |      |       |       |      |       |       |      |      |
| Minimum Initial (s)     | 8.0   | 8.0   |      | 8.0   | 8.0   |      | 8.0   | 8.0   |      | 8.0   | 8.0   |      | 8.0  |
| Minimum Split (s)       | 13.0  | 13.0  |      | 13.0  | 13.0  |      | 14.0  | 14.0  |      | 14.0  | 14.0  |      | 18.0 |
| Total Split (s)         | 35.0  | 35.0  |      | 35.0  | 35.0  |      | 36.0  | 36.0  |      | 36.0  | 36.0  |      | 25.0 |
| Total Split (%)         | 36.5% | 36.5% |      | 36.5% | 36.5% |      | 37.5% | 37.5% |      | 37.5% | 37.5% |      | 26%  |
| Yellow Time (s)         | 4.0   | 4.0   |      | 4.0   | 4.0   |      | 4.0   | 4.0   |      | 4.0   | 4.0   |      | 4.0  |
| All-Red Time (s)        | 1.0   | 1.0   |      | 1.0   | 1.0   |      | 2.0   | 2.0   |      | 2.0   | 2.0   |      | 1.0  |
| Lost Time Adjust (s)    | 0.0   |       |      |       | 0.0   |      |       | 0.0   |      |       | 0.0   |      |      |
| Total Lost Time (s)     | 5.0   |       |      |       | 5.0   |      |       | 6.0   |      |       | 6.0   |      |      |
| Lead/Lag                | Lead  | Lead  |      | Lead  | Lead  |      | Lag   | Lag   |      | Lag   | Lag   |      |      |
| Lead-Lag Optimize?      |       |       |      |       |       |      |       |       |      |       |       |      |      |
| Recall Mode             | Min   | Min   |      | Min   | Min   |      | Min   | Min   |      | Min   | Min   |      | None |
| Act Effect Green (s)    | 10.4  |       |      |       | 10.4  |      |       | 30.9  |      |       | 30.9  |      |      |
| Actuated g/C Ratio      | 0.19  |       |      |       | 0.19  |      |       | 0.56  |      |       | 0.56  |      |      |
| v/c Ratio               | 0.61  |       |      |       | 0.43  |      |       | 0.67  |      |       | 0.17  |      |      |
| Control Delay           | 10.1  |       |      |       | 29.1  |      |       | 18.8  |      |       | 8.9   |      |      |
| Queue Delay             | 0.0   |       |      |       | 0.0   |      |       | 0.0   |      |       | 0.0   |      |      |
| Total Delay             | 10.1  |       |      |       | 29.1  |      |       | 18.8  |      |       | 8.9   |      |      |
| LOS                     | B     |       |      |       | C     |      |       | B     |      |       | A     |      |      |
| Approach Delay          | 10.1  |       |      |       | 29.1  |      |       | 18.8  |      |       | 8.9   |      |      |
| Approach LOS            | B     |       |      |       | C     |      |       | B     |      |       | A     |      |      |
| Queue Length 50th (ft)  | 9     |       |      |       | 17    |      |       | 71    |      |       | 17    |      |      |
| Queue Length 95th (ft)  | 81    |       |      |       | 64    |      |       | #407  |      |       | 95    |      |      |
| Internal Link Dist (ft) | 1975  |       |      |       | 412   |      |       | 146   |      |       | 682   |      |      |
| Turn Bay Length (ft)    |       |       |      |       |       |      |       |       |      |       |       |      |      |
| Base Capacity (vph)     | 1015  |       |      |       | 474   |      |       | 711   |      |       | 1022  |      |      |
| Starvation Cap Reductn  | 0     |       |      |       | 0     |      |       | 0     |      |       | 0     |      |      |
| Spillback Cap Reductn   | 0     |       |      |       | 0     |      |       | 0     |      |       | 0     |      |      |
| Storage Cap Reductn     | 0     |       |      |       | 0     |      |       | 0     |      |       | 0     |      |      |
| Reduced v/c Ratio       | 0.32  |       |      |       | 0.15  |      |       | 0.67  |      |       | 0.17  |      |      |

Intersection Summary

|                                                                 |                        |                        |
|-----------------------------------------------------------------|------------------------|------------------------|
| Area Type:                                                      | Other                  |                        |
| Cycle Length:                                                   | 96                     |                        |
| Actuated Cycle Length:                                          | 55.3                   |                        |
| Natural Cycle:                                                  | 65                     |                        |
| Control Type:                                                   | Actuated-Uncoordinated |                        |
| Maximum v/c Ratio:                                              | 0.67                   |                        |
| Intersection Signal Delay:                                      | 15.2                   | Intersection LOS: B    |
| Intersection Capacity Utilization:                              | 64.9%                  | ICU Level of Service C |
| Analysis Period (min):                                          | 15                     |                        |
| # 95th percentile volume exceeds capacity, queue may be longer. |                        |                        |
| Queue shown is maximum after two cycles.                        |                        |                        |

Splits and Phases: 4: Oak Street & Chestnut Street



Lanes, Volumes, Timings  
VHB/MSD

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07/03/2018



12239.00 :: Needham Street  
5: Oak Street & Site Driveway

2025 No Build Conditions  
Timing Plan: Weekday Evening

| Intersection             |        |        |       |        |       |      |
|--------------------------|--------|--------|-------|--------|-------|------|
| Int Delay, s/veh         | 3      |        |       |        |       |      |
| Movement                 | WBL    | WBR    | NBT   | NBR    | SBL   | SBT  |
| Lane Configurations      | W      |        | W     |        | S     | W    |
| Traffic Vol, veh/h       | 100    | 20     | 415   | 20     | 5     | 425  |
| Future Vol, veh/h        | 100    | 20     | 415   | 20     | 5     | 425  |
| Conflicting Peds, #/hr   | 0      | 0      | 0     | 6      | 6     | 0    |
| Sign Control             | Stop   | Stop   | Free  | Free   | Free  | Free |
| RT Channelized           | -      | None   | -     | None   | -     | None |
| Storage Length           | 0      | -      | -     | -      | -     | -    |
| Veh in Median Storage, # | 0      | -      | 0     | -      | -     | 0    |
| Grade, %                 | 0      | -      | 0     | -      | -     | 0    |
| Peak Hour Factor         | 92     | 92     | 92    | 92     | 92    | 92   |
| Heavy Vehicles, %        | 0      | 0      | 1     | 1      | 1     | 1    |
| Mvmt Flow                | 109    | 22     | 451   | 22     | 5     | 462  |
| Major/Minor              | Minor1 | Major1 |       | Major2 |       |      |
| Conflicting Flow All     | 941    | 468    | 0     | 0      | 479   | 0    |
| Stage 1                  | 468    | -      | -     | -      | -     | -    |
| Stage 2                  | 473    | -      | -     | -      | -     | -    |
| Critical Hdwy            | 6.4    | 6.2    | -     | -      | 4.11  | -    |
| Critical Hdwy Stg 1      | 5.4    | -      | -     | -      | -     | -    |
| Critical Hdwy Stg 2      | 5.4    | -      | -     | -      | -     | -    |
| Follow-up Hdwy           | 3.5    | 3.3    | -     | -      | 2.209 | -    |
| Pot Cap-1 Maneuver       | 295    | 599    | -     | -      | 1089  | -    |
| Stage 1                  | 634    | -      | -     | -      | -     | -    |
| Stage 2                  | 631    | -      | -     | -      | -     | -    |
| Platoon blocked, %       | -      | -      | -     | -      | -     | -    |
| Mov Cap-1 Maneuver       | 292    | 596    | -     | -      | 1089  | -    |
| Mov Cap-2 Maneuver       | 292    | -      | -     | -      | -     | -    |
| Stage 1                  | 631    | -      | -     | -      | -     | -    |
| Stage 2                  | 627    | -      | -     | -      | -     | -    |
| Approach                 | WB     | NB     |       | SB     |       |      |
| HCM Control Delay, s     | 23.9   | 0      |       | 0.1    |       |      |
| HCM LOS                  | C      |        |       |        |       |      |
| Minor Lane/Major Mvmt    | NBT    | NBR    | WBLn1 | SBL    | SBT   |      |
| Capacity (veh/h)         | -      | -      | 319   | 1089   | -     | -    |
| HCM Lane V/C Ratio       | -      | -      | 0.409 | 0.005  | -     | -    |
| HCM Control Delay (s)    | -      | -      | 23.9  | 8.3    | 0     | -    |
| HCM Lane LOS             | -      | -      | C     | A      | A     | -    |
| HCM 95th %ile Q(veh)     | -      | -      | 1.9   | 0      | -     | -    |

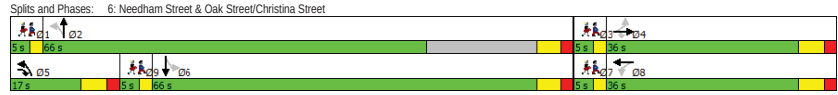
12239.00 :: Needham Street  
6: Needham Street & Oak Street/Christina Street

2025 No Build Conditions  
Timing Plan: Weekday Evening

| Lane Group                                                      | EBL                    | EBT   | EBR   | WBL   | WBT   | WBR  | NBL   | NBT   | NBR                 | SBL   | SBT   | SBR  | Ø1   | Ø3   | Ø7   | Ø9   |   |
|-----------------------------------------------------------------|------------------------|-------|-------|-------|-------|------|-------|-------|---------------------|-------|-------|------|------|------|------|------|---|
| Lane Configurations                                             |                        |       |       |       |       |      |       |       |                     |       |       |      |      |      |      |      |   |
| Traffic Volume (vph)                                            | 200                    | 120   | 215   | 120   | 130   | 45   | 160   | 740   | 70                  | 40    | 740   | 145  |      |      |      |      |   |
| Future Volume (vph)                                             | 200                    | 120   | 215   | 120   | 130   | 45   | 160   | 740   | 70                  | 40    | 740   | 145  |      |      |      |      |   |
| Ideal Flow (vphpl)                                              | 1900                   | 1900  | 1900  | 1900  | 1900  | 1900 | 1900  | 1900  | 1900                | 1900  | 1900  | 1900 |      |      |      |      |   |
| Storage Length (ft)                                             | 0                      |       | 100   | 200   |       | 50   | 0     |       | 1                   | 0     | 220   | 0    |      |      |      |      |   |
| Storage Lanes                                                   | 0                      |       | 1     | 1     |       | 0    | 1     |       | 0                   | 1     | 1     | 0    |      |      |      |      |   |
| Taper Length (ft)                                               | 25                     |       |       |       |       |      | 25    |       |                     |       | 25    |      |      |      |      |      |   |
| Satd. Flow (prot)                                               | 0                      | 1843  | 1615  | 1805  | 1812  | 0    | 1805  | 1871  | 0                   | 1787  | 1834  | 0    |      |      |      |      |   |
| Flt Permitted                                                   |                        | 0.585 |       | 0.254 |       |      | 0.059 |       |                     | 0.201 |       |      |      |      |      |      |   |
| Satd. Flow (perm)                                               | 0                      | 1107  | 1574  | 483   | 1812  | 0    | 112   | 1871  | 0                   | 378   | 1834  | 0    |      |      |      |      |   |
| Right Turn on Red                                               |                        |       | Yes   |       |       | Yes  |       |       | Yes                 |       |       | Yes  |      |      |      |      |   |
| Satd. Flow (RTOR)                                               |                        |       | 138   |       | 13    |      |       | 7     |                     |       | 10    |      |      |      |      |      |   |
| Link Speed (mph)                                                |                        | 30    |       |       | 30    |      |       | 30    |                     |       | 30    |      |      |      |      |      |   |
| Link Distance (ft)                                              |                        | 1238  |       |       | 516   |      |       | 754   |                     |       | 275   |      |      |      |      |      |   |
| Travel Time (s)                                                 |                        | 28.1  |       |       | 11.7  |      |       | 17.1  |                     |       | 6.3   |      |      |      |      |      |   |
| Confl. Peds. (#/hr)                                             | 2                      |       | 1     | 1     |       | 2    |       |       | 1                   | 1     |       |      |      |      |      |      |   |
| Peak Hour Factor                                                | 0.92                   | 0.92  | 0.92  | 0.92  | 0.92  | 0.92 | 0.92  | 0.92  | 0.92                | 0.92  | 0.92  | 0.92 |      |      |      |      |   |
| Heavy Vehicles (%)                                              | 0%                     | 0%    | 0%    | 0%    | 0%    | 0%   | 0%    | 0%    | 0%                  | 0%    | 1%    | 1%   |      |      |      |      |   |
| Shared Lane Traffic (%)                                         |                        |       |       |       |       |      |       |       |                     |       |       |      |      |      |      |      |   |
| Lane Group Flow (vph)                                           | 0                      | 347   | 234   | 130   | 190   | 0    | 174   | 880   | 0                   | 43    | 962   | 0    |      |      |      |      |   |
| Turn Type                                                       | Perm                   | NA    | pm+ov | Perm  | NA    |      | pm+pt | NA    |                     | Perm  | NA    |      |      |      |      |      |   |
| Protected Phases                                                |                        | 4     | 5     |       | 8     |      | 5     | 2     |                     |       | 6     |      |      | 1    | 3    | 7    | 9 |
| Permitted Phases                                                |                        | 4     |       | 5     | 8     |      | 2     |       |                     | 6     |       |      |      |      |      |      |   |
| Detector Phase                                                  |                        | 4     | 4     | 5     | 8     | 8    | 5     | 2     |                     | 6     | 6     |      |      |      |      |      |   |
| Switch Phase                                                    |                        |       |       |       |       |      |       |       |                     |       |       |      |      |      |      |      |   |
| Minimum Initial (s)                                             | 6.0                    | 6.0   | 6.0   | 6.0   | 6.0   |      | 6.0   | 15.0  |                     | 15.0  | 15.0  |      | 3.0  | 3.0  | 3.0  | 3.0  |   |
| Minimum Split (s)                                               | 22.0                   | 22.0  | 13.0  | 26.0  | 26.0  |      | 13.0  | 29.0  |                     | 28.0  | 28.0  |      | 5.0  | 5.0  | 5.0  | 5.0  |   |
| Total Split (s)                                                 | 36.0                   | 36.0  | 17.0  | 36.0  | 36.0  |      | 17.0  | 66.0  |                     | 66.0  | 66.0  |      | 5.0  | 5.0  | 5.0  | 5.0  |   |
| Total Split (%)                                                 | 27.9%                  | 27.9% | 13.2% | 27.9% | 27.9% |      | 13.2% | 51.2% |                     | 51.2% | 51.2% |      | 4%   | 4%   | 4%   | 4%   |   |
| Yellow Time (s)                                                 | 4.0                    | 4.0   | 4.0   | 4.0   | 4.0   |      | 4.0   | 4.0   |                     | 4.0   | 4.0   |      | 2.0  | 2.0  | 2.0  | 2.0  |   |
| All-Red Time (s)                                                | 2.0                    | 2.0   | 2.0   | 2.0   | 2.0   |      | 2.0   | 2.0   |                     | 2.0   | 2.0   |      | 0.0  | 0.0  | 0.0  | 0.0  |   |
| Lost Time Adjust (s)                                            |                        | 0.0   | 0.0   | 0.0   | 0.0   |      | 0.0   | 0.0   |                     | 0.0   | 0.0   |      |      |      |      |      |   |
| Total Lost Time (s)                                             |                        | 6.0   | 6.0   | 6.0   | 6.0   |      | 6.0   | 6.0   |                     | 6.0   | 6.0   |      |      |      |      |      |   |
| Lead/Lag                                                        | Lag                    | Lag   | Lag   | Lead  | Lag   | Lag  | Lead  | Lag   |                     |       |       |      | Lead | Lead | Lead | Lag  |   |
| Lead-Lag Optimize?                                              |                        |       |       |       |       |      |       |       |                     |       |       |      |      |      |      |      |   |
| Recall Mode                                                     | None                   | None  | None  | None  | None  | None | None  | None  | None                | None  | None  | None | None | None | None | None |   |
| Act Effct Green (s)                                             |                        | 30.0  | 40.8  | 30.0  | 30.0  |      | 76.8  | 75.8  |                     | 60.0  | 60.0  |      |      |      |      |      |   |
| Actuated g/C Ratio                                              |                        | 0.25  | 0.34  | 0.25  | 0.25  |      | 0.64  | 0.63  |                     | 0.50  | 0.50  |      |      |      |      |      |   |
| v/c Ratio                                                       |                        | 1.25  | 0.37  | 1.08  | 0.41  |      | 0.78  | 0.74  |                     | 0.23  | 1.04  |      |      |      |      |      |   |
| Control Delay                                                   |                        | 178.3 | 12.4  | 149.4 | 38.4  |      | 50.0  | 20.7  |                     | 21.5  | 71.0  |      |      |      |      |      |   |
| Queue Delay                                                     |                        | 0.0   | 0.0   | 0.0   | 0.0   |      | 0.0   | 0.0   |                     | 0.0   | 14.6  |      |      |      |      |      |   |
| Total Delay                                                     |                        | 178.3 | 12.4  | 149.4 | 38.4  |      | 50.0  | 20.7  |                     | 21.5  | 85.7  |      |      |      |      |      |   |
| LOS                                                             |                        | F     | B     | F     | D     |      | D     | C     |                     | C     | F     |      |      |      |      |      |   |
| Approach Delay                                                  |                        | 111.5 |       |       | 83.5  |      |       | 25.5  |                     |       | 82.9  |      |      |      |      |      |   |
| Approach LOS                                                    |                        | F     |       |       | F     |      |       | C     |                     |       | F     |      |      |      |      |      |   |
| Queue Length 50th (ft)                                          |                        | ~332  | 47    | ~110  | 113   |      | 80    | 411   |                     | 18    | ~791  |      |      |      |      |      |   |
| Queue Length 95th (ft)                                          |                        | #545  | 114   | #249  | 193   |      | #204  | 725   |                     | 48    | #1113 |      |      |      |      |      |   |
| Internal Link Dist (ft)                                         |                        | 1158  |       |       | 436   |      |       | 674   |                     |       | 195   |      |      |      |      |      |   |
| Turn Bay Length (ft)                                            |                        |       | 100   | 200   |       |      |       |       |                     | 220   |       |      |      |      |      |      |   |
| Base Capacity (vph)                                             |                        | 277   | 633   | 120   | 463   |      | 227   | 1205  |                     | 189   | 923   |      |      |      |      |      |   |
| Starvation Cap Reductn                                          |                        | 0     | 0     | 0     | 0     |      | 0     | 0     |                     | 0     | 33    |      |      |      |      |      |   |
| Spillback Cap Reductn                                           |                        | 0     | 0     | 0     | 0     |      | 0     | 0     |                     | 0     | 0     |      |      |      |      |      |   |
| Storage Cap Reductn                                             |                        | 0     | 0     | 0     | 0     |      | 0     | 0     |                     | 0     | 0     |      |      |      |      |      |   |
| Reduced v/c Ratio                                               |                        | 1.25  | 0.37  | 1.08  | 0.41  |      | 0.77  | 0.73  |                     | 0.23  | 1.08  |      |      |      |      |      |   |
| Intersection Summary                                            |                        |       |       |       |       |      |       |       |                     |       |       |      |      |      |      |      |   |
| Area Type:                                                      | Other                  |       |       |       |       |      |       |       |                     |       |       |      |      |      |      |      |   |
| Cycle Length: 129                                               |                        |       |       |       |       |      |       |       |                     |       |       |      |      |      |      |      |   |
| Actuated Cycle Length: 119.8                                    |                        |       |       |       |       |      |       |       |                     |       |       |      |      |      |      |      |   |
| Natural Cycle: 140                                              |                        |       |       |       |       |      |       |       |                     |       |       |      |      |      |      |      |   |
| Control Type: Actuated-Uncoordinated                            |                        |       |       |       |       |      |       |       |                     |       |       |      |      |      |      |      |   |
| Maximum v/c Ratio: 1.25                                         |                        |       |       |       |       |      |       |       |                     |       |       |      |      |      |      |      |   |
| Intersection Signal Delay: 68.1                                 |                        |       |       |       |       |      |       |       | Intersection LOS: E |       |       |      |      |      |      |      |   |
| Intersection Capacity Utilization 103.7%                        | ICU Level of Service G |       |       |       |       |      |       |       |                     |       |       |      |      |      |      |      |   |
| Analysis Period (min) 15                                        |                        |       |       |       |       |      |       |       |                     |       |       |      |      |      |      |      |   |
| ~ Volume exceeds capacity, queue is theoretically infinite.     |                        |       |       |       |       |      |       |       |                     |       |       |      |      |      |      |      |   |
| ~ Queue shown is maximum after two cycles.                      |                        |       |       |       |       |      |       |       |                     |       |       |      |      |      |      |      |   |
| # 95th percentile volume exceeds capacity, queue may be longer. |                        |       |       |       |       |      |       |       |                     |       |       |      |      |      |      |      |   |
| ~ Queue shown is maximum after two cycles.                      |                        |       |       |       |       |      |       |       |                     |       |       |      |      |      |      |      |   |

12239.00 :: Needham Street  
6: Needham Street & Oak Street/Christina Street

2025 No Build Conditions  
Timing Plan: Weekday Evening



12239.00 :: Needham Street  
7: Needham Street & South Site Driveway

2025 No Build Conditions  
Timing Plan: Weekday Evening

| Intersection             |        |        |       |        |      |      |
|--------------------------|--------|--------|-------|--------|------|------|
| Int Delay, s/veh         | 0.2    |        |       |        |      |      |
| Movement                 | EBL    | EBR    | NBL   | NBT    | SBT  | SBR  |
| Lane Configurations      | W      |        |       | W      | W    |      |
| Traffic Vol, veh/h       | 5      | 5      | 1     | 985    | 920  | 1    |
| Future Vol, veh/h        | 5      | 5      | 1     | 985    | 920  | 1    |
| Conflicting Peds, #/hr   | 0      | 0      | 7     | 0      | 0    | 7    |
| Sign Control             | Stop   | Stop   | Free  | Free   | Free | Free |
| RT Channelized           | -      | None   | -     | None   | -    | None |
| Storage Length           | 0      | -      | -     | -      | -    | -    |
| Veh in Median Storage, # | 0      | -      | -     | 0      | 0    | -    |
| Grade, %                 | 0      | -      | -     | 0      | 0    | -    |
| Peak Hour Factor         | 92     | 92     | 92    | 92     | 92   | 92   |
| Heavy Vehicles, %        | 0      | 0      | 1     | 1      | 1    | 1    |
| Mvmt Flow                | 5      | 5      | 1     | 1071   | 1000 | 1    |
|                          |        |        |       |        |      |      |
| Major/Minor              | Minor2 | Major1 |       | Major2 |      |      |
| Conflicting Flow All     | 2081   | 1008   | 1008  | 0      | -    | 0    |
| Stage 1                  | 1008   | -      | -     | -      | -    | -    |
| Stage 2                  | 1073   | -      | -     | -      | -    | -    |
| Critical Hdwy            | 6.4    | 6.2    | 4.11  | -      | -    | -    |
| Critical Hdwy Stg 1      | 5.4    | -      | -     | -      | -    | -    |
| Critical Hdwy Stg 2      | 5.4    | -      | -     | -      | -    | -    |
| Follow-up Hdwy           | 3.5    | 3.3    | 2.209 | -      | -    | -    |
| Pot Cap-1 Maneuver       | 59     | 295    | 691   | -      | -    | -    |
| Stage 1                  | 356    | -      | -     | -      | -    | -    |
| Stage 2                  | 331    | -      | -     | -      | -    | -    |
| Platoon blocked, %       |        |        |       | -      | -    | -    |
| Mov Cap-1 Maneuver       | 58     | 293    | 691   | -      | -    | -    |
| Mov Cap-2 Maneuver       | 58     | -      | -     | -      | -    | -    |
| Stage 1                  | 354    | -      | -     | -      | -    | -    |
| Stage 2                  | 328    | -      | -     | -      | -    | -    |
|                          |        |        |       |        |      |      |
| Approach                 | EB     | NB     |       | SB     |      |      |
| HCM Control Delay, s     | 46.7   | 0      |       | 0      |      |      |
| HCM LOS                  | E      |        |       |        |      |      |
|                          |        |        |       |        |      |      |
| Minor Lane/Major Mvmt    | NBL    | NBT    | EBLn1 | SBT    | SBR  |      |
| Capacity (veh/h)         | 691    | -      | 97    | -      | -    |      |
| HCM Lane V/C Ratio       | 0.002  | -      | 0.112 | -      | -    |      |
| HCM Control Delay (s)    | 10.2   | 0      | 46.7  | -      | -    |      |
| HCM Lane LOS             | B      | A      | E     | -      | -    |      |
| HCM 95th %ile Q(veh)     | 0      | -      | 0.4   | -      | -    |      |

12239.00 :: Needham Street  
8: Needham Street & Middle Site Driveway/TJMaxx Driveway

2025 No Build Conditions  
Timing Plan: Weekday Evening

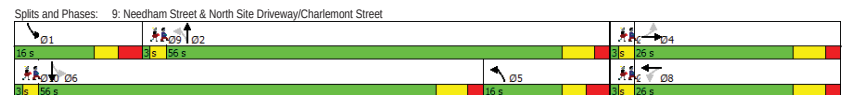
| Intersection             |        |      |      |       |       |      |        |      |      |        |      |      |  |
|--------------------------|--------|------|------|-------|-------|------|--------|------|------|--------|------|------|--|
| Int Delay, s/veh         | 1.4    |      |      |       |       |      |        |      |      |        |      |      |  |
| Movement                 | EBL    | EBT  | EBR  | WBL   | WBT   | WBR  | NBL    | NBT  | NBR  | SBL    | SBT  | SBR  |  |
| Lane Configurations      |        |      |      |       |       |      |        |      |      |        |      |      |  |
| Traffic Vol, veh/h       | 5      | 0    | 85   | 2     | 0     | 1    | 35     | 865  | 20   | 10     | 800  | 1    |  |
| Future Vol, veh/h        | 5      | 0    | 85   | 2     | 0     | 1    | 35     | 865  | 20   | 10     | 800  | 1    |  |
| Conflicting Peds, #/hr   | 0      | 0    | 0    | 0     | 0     | 0    | 7      | 0    | 4    | 4      | 0    | 7    |  |
| Sign Control             | Stop   | Stop | Stop | Stop  | Stop  | Stop | Free   | Free | Free | Free   | Free | Free |  |
| RT Channelized           | -      | -    | None | -     | -     | None | -      | -    | None | -      | -    | None |  |
| Storage Length           | -      | -    | -    | -     | -     | -    | 120    | -    | -    | 80     | -    | -    |  |
| Veh in Median Storage, # | -      | 0    | -    | -     | -     | -    | -      | 0    | -    | -      | 0    | -    |  |
| Grade, %                 | -      | 0    | -    | -     | 0     | -    | -      | 0    | -    | -      | 0    | -    |  |
| Peak Hour Factor         | 92     | 92   | 92   | 92    | 92    | 92   | 92     | 92   | 92   | 92     | 92   | 92   |  |
| Heavy Vehicles, %        | 0      | 0    | 0    | 0     | 0     | 0    | 1      | 1    | 1    | 1      | 1    | 1    |  |
| Mvmt Flow                | 5      | 0    | 92   | 2     | 0     | 1    | 38     | 940  | 22   | 11     | 870  | 1    |  |
| Major/Minor              |        |      |      |       |       |      |        |      |      |        |      |      |  |
|                          | Minor2 |      |      |       |       |      | Major1 |      |      | Major2 |      |      |  |
| Conflicting Flow All     | 1926   | 1941 | 877  |       |       |      | 878    | 0    | 0    | 966    | 0    | 0    |  |
| Stage 1                  | 899    | 899  | -    |       |       |      | -      | -    | -    | -      | -    | -    |  |
| Stage 2                  | 1027   | 1042 | -    |       |       |      | -      | -    | -    | -      | -    | -    |  |
| Critical Hdwy            | 6.4    | 6.5  | 6.2  |       |       |      | 4.11   | -    | -    | 4.11   | -    | -    |  |
| Critical Hdwy Stg 1      | 5.4    | 5.5  | -    |       |       |      | -      | -    | -    | -      | -    | -    |  |
| Critical Hdwy Stg 2      | 5.4    | 5.5  | -    |       |       |      | -      | -    | -    | -      | -    | -    |  |
| Follow-up Hdwy           | 3.5    | 4    | 3.3  |       |       |      | 2.209  | -    | -    | 2.209  | -    | -    |  |
| Pot Cap-1 Maneuver       | 74     | 66   | 351  |       |       |      | 774    | -    | -    | 717    | -    | -    |  |
| Stage 1                  | 401    | 360  | -    |       |       |      | -      | -    | -    | -      | -    | -    |  |
| Stage 2                  | 348    | 309  | -    |       |       |      | -      | -    | -    | -      | -    | -    |  |
| Platoon blocked, %       |        |      |      |       |       |      | -      | -    | -    | -      | -    | -    |  |
| Mov Cap-1 Maneuver       | 68     | 0    | 349  |       |       |      | 774    | -    | -    | 717    | -    | -    |  |
| Mov Cap-2 Maneuver       | 68     | 0    | -    |       |       |      | -      | -    | -    | -      | -    | -    |  |
| Stage 1                  | 393    | 0    | -    |       |       |      | -      | -    | -    | -      | -    | -    |  |
| Stage 2                  | 329    | 0    | -    |       |       |      | -      | -    | -    | -      | -    | -    |  |
| Approach                 |        |      |      |       |       |      |        |      |      |        |      |      |  |
|                          | EB     |      |      |       |       |      | NB     |      |      | SB     |      |      |  |
| HCM Control Delay, s     | 24.2   |      |      |       |       |      | 0.4    |      |      | 0.1    |      |      |  |
| HCM LOS                  | C      |      |      |       |       |      |        |      |      |        |      |      |  |
| Minor Lane/Major Mvmt    |        |      |      |       |       |      |        |      |      |        |      |      |  |
|                          | NBL    | NBT  | NBR  | EBLn1 | SBL   | SBT  | SBR    |      |      |        |      |      |  |
| Capacity (veh/h)         | 774    | -    | -    | 284   | 717   | -    | -      |      |      |        |      |      |  |
| HCM Lane V/C Ratio       | 0.049  | -    | -    | 0.344 | 0.015 | -    | -      |      |      |        |      |      |  |
| HCM Control Delay (s)    | 9.9    | -    | -    | 24.2  | 10.1  | -    | -      |      |      |        |      |      |  |
| HCM Lane LOS             | A      | -    | -    | C     | B     | -    | -      |      |      |        |      |      |  |
| HCM 95th %tile Q(veh)    | 0.2    | -    | -    | 1.5   | 0     | -    | -      |      |      |        |      |      |  |

12239.00 :: Needham Street  
9: Needham Street & North Site Driveway/Charlemont Street

2025 No Build Conditions  
Timing Plan: Weekday Evening

| Lane Group              | EBL   | EBT   | EBR  | WBL   | WBT   | WBR  | NBL   | NBT   | NBR  | SBL   | SBT   | SBR  | Ø3   | Ø7   | Ø9   | Ø10  |
|-------------------------|-------|-------|------|-------|-------|------|-------|-------|------|-------|-------|------|------|------|------|------|
| Lane Configurations     |       |       |      |       |       |      |       |       |      |       |       |      |      |      |      |      |
| Traffic Volume (vph)    | 80    | 0     | 30   | 35    | 15    | 25   | 25    | 820   | 25   | 5     | 745   | 65   |      |      |      |      |
| Future Volume (vph)     | 80    | 0     | 30   | 35    | 15    | 25   | 25    | 820   | 25   | 5     | 745   | 65   |      |      |      |      |
| Ideal Flow (vphpl)      | 1900  | 1900  | 1900 | 1900  | 1900  | 1900 | 1900  | 1900  | 1900 | 1900  | 1900  | 1900 |      |      |      |      |
| Storage Length (ft)     | 125   | 0     | 125  | 0     | 125   | 0    | 100   | 0     | 100  | 0     | 100   | 0    |      |      |      |      |
| Storage Lanes           | 1     | 0     | 1    | 0     | 1     | 0    | 1     | 0     | 1    | 0     | 1     | 0    |      |      |      |      |
| Taper Length (ft)       | 25    |       |      | 25    |       |      | 25    |       |      | 25    |       |      |      |      |      |      |
| Satd. Flow (prot)       | 1805  | 1615  | 0    | 1805  | 1721  | 0    | 1787  | 1872  | 0    | 1787  | 1852  | 0    |      |      |      |      |
| Flt Permitted           | 0.729 |       |      | 0.736 |       |      | 0.239 |       |      | 0.146 |       |      |      |      |      |      |
| Satd. Flow (perm)       | 1385  | 1615  | 0    | 1398  | 1721  | 0    | 450   | 1872  | 0    | 275   | 1852  | 0    |      |      |      |      |
| Right Turn on Red       |       |       | Yes  |       |       | Yes  |       |       | Yes  |       |       | Yes  |      |      |      |      |
| Satd. Flow (RTOR)       | 330   |       |      | 27    |       |      | 2     |       |      | 6     |       |      |      |      |      |      |
| Link Speed (mph)        | 30    |       |      | 30    |       |      | 30    |       |      | 30    |       |      |      |      |      |      |
| Link Distance (ft)      | 491   |       |      | 696   |       |      | 244   |       |      | 497   |       |      |      |      |      |      |
| Travel Time (s)         | 11.2  |       |      | 15.8  |       |      | 5.5   |       |      | 11.3  |       |      |      |      |      |      |
| Confl. Peds. (#/hr)     |       |       |      |       |       |      | 7     |       | 3    | 3     |       | 7    |      |      |      |      |
| Confl. Bikes (#/hr)     |       |       |      |       |       |      | 2     |       |      |       |       |      |      |      |      |      |
| Peak Hour Factor        | 0.92  | 0.92  | 0.92 | 0.92  | 0.92  | 0.92 | 0.92  | 0.92  | 0.92 | 0.92  | 0.92  | 0.92 |      |      |      |      |
| Heavy Vehicles (%)      | 0%    | 0%    | 0%   | 0%    | 0%    | 0%   | 1%    | 1%    | 1%   | 1%    | 1%    | 1%   |      |      |      |      |
| Shared Lane Traffic (%) |       |       |      |       |       |      |       |       |      |       |       |      |      |      |      |      |
| Lane Group Flow (vph)   | 87    | 33    | 0    | 38    | 43    | 0    | 27    | 918   | 0    | 5     | 881   | 0    |      |      |      |      |
| Turn Type               | Perm  | NA    |      | Perm  | NA    |      | pm+pt | NA    |      | pm+pt | NA    |      |      |      |      |      |
| Protected Phases        | 4     |       |      | 8     |       |      | 5     | 2     |      | 1     | 6     |      | 3    | 7    | 9    | 10   |
| Permitted Phases        | 4     |       |      | 8     |       |      | 2     |       |      | 6     |       |      |      |      |      |      |
| Detector Phase          | 4     | 4     |      | 8     | 8     |      | 5     | 2     |      | 1     | 6     |      |      |      |      |      |
| Switch Phase            |       |       |      |       |       |      |       |       |      |       |       |      |      |      |      |      |
| Minimum Initial (s)     | 3.0   | 3.0   |      | 3.0   | 3.0   |      | 3.0   | 3.0   |      | 3.0   | 3.0   |      | 1.0  | 1.0  | 1.0  | 1.0  |
| Minimum Split (s)       | 23.0  | 23.0  |      | 23.0  | 23.0  |      | 9.0   | 22.0  |      | 9.0   | 22.0  |      | 3.0  | 3.0  | 3.0  | 3.0  |
| Total Split (s)         | 26.0  | 26.0  |      | 26.0  | 26.0  |      | 16.0  | 56.0  |      | 16.0  | 56.0  |      | 3.0  | 3.0  | 3.0  | 3.0  |
| Total Split (%)         | 25.0% | 25.0% |      | 25.0% | 25.0% |      | 15.4% | 53.8% |      | 15.4% | 53.8% |      | 3%   | 3%   | 3%   | 3%   |
| Yellow Time (s)         | 4.0   | 4.0   |      | 4.0   | 4.0   |      | 3.0   | 4.0   |      | 3.0   | 4.0   |      | 2.0  | 2.0  | 2.0  | 2.0  |
| All-Red Time (s)        | 2.0   | 2.0   |      | 2.0   | 2.0   |      | 3.0   | 2.0   |      | 3.0   | 2.0   |      | 0.0  | 0.0  | 0.0  | 0.0  |
| Lost Time Adjust (s)    | 0.0   | 0.0   |      | 0.0   | 0.0   |      | 0.0   | 0.0   |      | 0.0   | 0.0   |      |      |      |      |      |
| Total Lost Time (s)     | 6.0   | 6.0   |      | 6.0   | 6.0   |      | 6.0   | 6.0   |      | 6.0   | 6.0   |      |      |      |      |      |
| Lead/Lag                | Lag   | Lag   |      | Lag   | Lag   |      | 6.0   | 6.0   |      |       |       |      | Lead | Lag  | Lead | Lead |
| Lead-Lag Optimize?      |       |       |      |       |       |      |       |       |      |       |       |      |      |      |      |      |
| Recall Mode             | None  | None  |      | None  | None  |      | None  | Min   |      | None  | Min   |      | None | None | None | None |
| Act Effect Green (s)    | 9.4   | 9.4   |      | 9.2   | 9.2   |      | 56.9  | 55.1  |      | 52.2  | 53.2  |      |      |      |      |      |
| Actuated g/C Ratio      | 0.13  | 0.13  |      | 0.12  | 0.12  |      | 0.76  | 0.74  |      | 0.70  | 0.71  |      |      |      |      |      |
| v/c Ratio               | 0.50  | 0.07  |      | 0.22  | 0.18  |      | 0.06  | 0.66  |      | 0.02  | 0.67  |      |      |      |      |      |
| Control Delay           | 42.9  | 0.3   |      | 34.8  | 19.5  |      | 6.6   | 12.6  |      | 7.0   | 14.1  |      |      |      |      |      |
| Queue Delay             | 0.0   | 0.0   |      | 0.0   | 0.0   |      | 0.0   | 0.0   |      | 0.0   | 0.0   |      |      |      |      |      |
| Total Delay             | 42.9  | 0.3   |      | 34.8  | 19.5  |      | 6.6   | 12.6  |      | 7.0   | 14.1  |      |      |      |      |      |
| LOS                     | D     | A     |      | C     | B     |      | A     | B     |      | A     | B     |      |      |      |      |      |
| Approach Delay          |       | 31.2  |      |       | 26.7  |      |       | 12.4  |      |       | 14.1  |      |      |      |      |      |
| Approach LOS            |       | C     |      |       | C     |      |       | B     |      |       | B     |      |      |      |      |      |
| Queue Length 50th (ft)  | 35    | 0     |      | 15    | 6     |      | 1     | 194   |      | 1     | 179   |      |      |      |      |      |
| Queue Length 95th (ft)  | 92    | 0     |      | 48    | 37    |      | 18    | #712  |      | 6     | #668  |      |      |      |      |      |
| Internal Link Dist (ft) |       | 411   |      |       | 616   |      |       | 164   |      |       | 417   |      |      |      |      |      |
| Turn Bay Length (ft)    | 125   |       |      | 125   |       |      | 100   |       |      | 100   |       |      |      |      |      |      |
| Base Capacity (vph)     | 379   | 682   |      | 383   | 491   |      | 548   | 1389  |      | 399   | 1329  |      |      |      |      |      |
| Starvation Cap Reductn  | 0     | 0     |      | 0     | 0     |      | 0     | 0     |      | 0     | 0     |      |      |      |      |      |
| Spillback Cap Reductn   | 0     | 0     |      | 0     | 0     |      | 0     | 0     |      | 0     | 0     |      |      |      |      |      |
| Storage Cap Reductn     | 0     | 0     |      | 0     | 0     |      | 0     | 0     |      | 0     | 0     |      |      |      |      |      |
| Reduced v/c Ratio       | 0.23  | 0.05  |      | 0.10  | 0.09  |      | 0.05  | 0.66  |      | 0.01  | 0.66  |      |      |      |      |      |

| Intersection Summary                                            |                        |
|-----------------------------------------------------------------|------------------------|
| Area Type:                                                      | Other                  |
| Cycle Length: 104                                               |                        |
| Actuated Cycle Length: 74.7                                     |                        |
| Natural Cycle: 90                                               |                        |
| Control Type: Actuated-Uncoordinated                            |                        |
| Maximum v/c Ratio: 0.67                                         |                        |
| Intersection Signal Delay: 14.8                                 | Intersection LOS: B    |
| Intersection Capacity Utilization 65.8%                         | ICU Level of Service C |
| Analysis Period (min) 15                                        |                        |
| # 95th percentile volume exceeds capacity, queue may be longer. |                        |
| Queue shown is maximum after two cycles.                        |                        |



12239.00 :: Needham Street  
10: Needham Street & Tower Road/Industrial Place

2025 No Build Conditions  
Timing Plan: Weekday Evening

| Intersection                                                                                                         |          |       |          |       |          |          |        |      |      |       |      |      |
|----------------------------------------------------------------------------------------------------------------------|----------|-------|----------|-------|----------|----------|--------|------|------|-------|------|------|
| Int Delay, s/veh                                                                                                     | 120      |       |          |       |          |          |        |      |      |       |      |      |
| Movement                                                                                                             | EBL      | EBT   | EBR      | WBL   | WBT      | WBR      | NBL    | NBT  | NBR  | SBL   | SBT  | SBR  |
| Lane Configurations                                                                                                  |          | ↕     |          |       | ↕        |          |        | ↕    |      | ↕     | ↕    |      |
| Traffic Vol, veh/h                                                                                                   | 65       | 5     | 75       | 65    | 5        | 45       | 65     | 860  | 40   | 20    | 675  | 55   |
| Future Vol, veh/h                                                                                                    | 65       | 5     | 75       | 65    | 5        | 45       | 65     | 860  | 40   | 20    | 675  | 55   |
| Conflicting Peds, #/hr                                                                                               | 0        | 0     | 8        | 8     | 0        | 0        | 9      | 0    | 2    | 2     | 0    | 9    |
| Sign Control                                                                                                         | Stop     | Stop  | Stop     | Stop  | Stop     | Stop     | Free   | Free | Free | Free  | Free | Free |
| RT Channelized                                                                                                       | -        | -     | None     | -     | -        | None     | -      | -    | None | -     | -    | None |
| Storage Length                                                                                                       | -        | -     | -        | -     | -        | -        | -      | -    | -    | 100   | -    | -    |
| Veh in Median Storage, #                                                                                             | -        | 0     | -        | -     | 0        | -        | -      | 0    | -    | -     | 0    | -    |
| Grade, %                                                                                                             | -        | 0     | -        | -     | 0        | -        | -      | 0    | -    | -     | 0    | -    |
| Peak Hour Factor                                                                                                     | 92       | 92    | 92       | 92    | 92       | 92       | 92     | 92   | 92   | 92    | 92   | 92   |
| Heavy Vehicles, %                                                                                                    | 1        | 1     | 1        | 1     | 1        | 1        | 0      | 0    | 0    | 1     | 1    | 1    |
| Mvmt Flow                                                                                                            | 71       | 5     | 82       | 71    | 5        | 49       | 71     | 935  | 43   | 22    | 734  | 60   |
| Major/Minor                                                                                                          | Minor2   |       | Minor1   |       | Major1   |          | Major2 |      |      |       |      |      |
| Conflicting Flow All                                                                                                 | 1941     | 1938  | 781      | 1959  | 1946     | 959      | 802    | 0    | 0    | 980   | 0    | 0    |
| Stage 1                                                                                                              | 816      | 816   | -        | 1100  | 1100     | -        | -      | -    | -    | -     | -    | -    |
| Stage 2                                                                                                              | 1125     | 1122  | -        | 859   | 846      | -        | -      | -    | -    | -     | -    | -    |
| Critical Hdwy                                                                                                        | 7.11     | 6.51  | 6.21     | 7.11  | 6.51     | 6.21     | 4.1    | -    | -    | 4.11  | -    | -    |
| Critical Hdwy Stg 1                                                                                                  | 6.11     | 5.51  | -        | 6.11  | 5.51     | -        | -      | -    | -    | -     | -    | -    |
| Critical Hdwy Stg 2                                                                                                  | 6.11     | 5.51  | -        | 6.11  | 5.51     | -        | -      | -    | -    | -     | -    | -    |
| Follow-up Hdwy                                                                                                       | 3.509    | 4.009 | 3.309    | 3.509 | 4.009    | 3.309    | 2.2    | -    | -    | 2.209 | -    | -    |
| Pot Cap-1 Maneuver                                                                                                   | ~ 49     | 66    | 396      | ~ 48  | 65       | 313      | 830    | -    | -    | 708   | -    | -    |
| Stage 1                                                                                                              | 372      | 392   | -        | 259   | 289      | -        | -      | -    | -    | -     | -    | -    |
| Stage 2                                                                                                              | 250      | 282   | -        | 352   | 380      | -        | -      | -    | -    | -     | -    | -    |
| Platoon blocked, %                                                                                                   | -        | -     | -        | -     | -        | -        | -      | -    | -    | -     | -    | -    |
| Mov Cap-1 Maneuver                                                                                                   | ~ 31     | 51    | 390      | ~ 29  | 50       | 312      | 824    | -    | -    | 708   | -    | -    |
| Mov Cap-2 Maneuver                                                                                                   | ~ 31     | 51    | -        | ~ 29  | 50       | -        | -      | -    | -    | -     | -    | -    |
| Stage 1                                                                                                              | 299      | 377   | -        | 209   | 233      | -        | -      | -    | -    | -     | -    | -    |
| Stage 2                                                                                                              | 167      | 228   | -        | 264   | 365      | -        | -      | -    | -    | -     | -    | -    |
| Approach                                                                                                             | EB       |       | WB       |       | NB       |          | SB     |      |      |       |      |      |
| HCM Control Delay, s                                                                                                 | \$ 862.6 |       | \$ 964.7 |       | 0.7      |          | 0.3    |      |      |       |      |      |
| HCM LOS                                                                                                              | F        |       | F        |       |          |          |        |      |      |       |      |      |
| Minor Lane/Major Mvmt                                                                                                | NBL      |       | NBT      | NBR   | EBLn1    | WBLn1    | SBL    | SBT  | SBR  |       |      |      |
| Capacity (veh/h)                                                                                                     | 824      |       | -        | -     | 61       | 46       | 708    | -    | -    |       |      |      |
| HCM Lane V/C Ratio                                                                                                   | 0.086    |       | -        | -     | 2.584    | 2.717    | 0.031  | -    | -    |       |      |      |
| HCM Control Delay (s)                                                                                                | 9.8      |       | 0        | -     | \$ 862.6 | \$ 964.7 | 10.2   | -    | -    |       |      |      |
| HCM Lane LOS                                                                                                         | A        |       | A        | -     | F        | F        | B      | -    | -    |       |      |      |
| HCM 95th %tile Q(veh)                                                                                                | 0.3      |       | -        | -     | 15.8     | 13.4     | 0.1    | -    | -    |       |      |      |
| Notes                                                                                                                |          |       |          |       |          |          |        |      |      |       |      |      |
| ~: Volume exceeds capacity    \$: Delay exceeds 300s    +: Computation Not Defined    *: All major volume in platoon |          |       |          |       |          |          |        |      |      |       |      |      |

12239.00 :: Needham Street  
11: Needham Street & Jaconnet Street

2025 No Build Conditions  
Timing Plan: Weekday Evening

| Intersection             |        |      |        |       |        |      |        |  |        |  |        |  |
|--------------------------|--------|------|--------|-------|--------|------|--------|--|--------|--|--------|--|
| Int Delay, s/veh         | 5.9    |      |        |       |        |      |        |  |        |  |        |  |
| Movement                 | WBL    | WBR  | NBT    | NBR   | SBL    | SBT  |        |  |        |  |        |  |
| Lane Configurations      | ↕      |      | ↕      |       | ↕      | ↕    |        |  |        |  |        |  |
| Traffic Vol, veh/h       | 55     | 30   | 875    | 30    | 10     | 735  |        |  |        |  |        |  |
| Future Vol, veh/h        | 55     | 30   | 875    | 30    | 10     | 735  |        |  |        |  |        |  |
| Conflicting Peds, #/hr   | 0      | 1    | 0      | 33    | 33     | 0    |        |  |        |  |        |  |
| Sign Control             | Stop   | Stop | Free   | Free  | Free   | Free |        |  |        |  |        |  |
| RT Channelized           | -      | None | -      | None  | -      | None |        |  |        |  |        |  |
| Storage Length           | 0      | -    | -      | -     | 100    | -    |        |  |        |  |        |  |
| Veh in Median Storage, # | 0      | -    | 0      | -     | -      | 0    |        |  |        |  |        |  |
| Grade, %                 | 0      | -    | 0      | -     | -      | 0    |        |  |        |  |        |  |
| Peak Hour Factor         | 92     | 92   | 92     | 92    | 92     | 92   |        |  |        |  |        |  |
| Heavy Vehicles, %        | 0      | 0    | 1      | 1     | 1      | 1    |        |  |        |  |        |  |
| Mvmt Flow                | 60     | 33   | 951    | 33    | 11     | 799  |        |  |        |  |        |  |
| Major/Minor              | Minor1 |      | Major1 |       | Major2 |      | Major2 |  | Major2 |  | Major2 |  |
| Conflicting Flow All     | 1821   | 1001 | 0      | 0     | 1017   | 0    |        |  |        |  |        |  |
| Stage 1                  | 1000   | -    | -      | -     | -      | -    |        |  |        |  |        |  |
| Stage 2                  | 821    | -    | -      | -     | -      | -    |        |  |        |  |        |  |
| Critical Hdwy            | 6.4    | 6.2  | -      | -     | 4.11   | -    |        |  |        |  |        |  |
| Critical Hdwy Stg 1      | 5.4    | -    | -      | -     | -      | -    |        |  |        |  |        |  |
| Critical Hdwy Stg 2      | 5.4    | -    | -      | -     | -      | -    |        |  |        |  |        |  |
| Follow-up Hdwy           | 3.5    | 3.3  | -      | -     | 2.209  | -    |        |  |        |  |        |  |
| Pot Cap-1 Maneuver       | 86     | 297  | -      | -     | 686    | -    |        |  |        |  |        |  |
| Stage 1                  | 359    | -    | -      | -     | -      | -    |        |  |        |  |        |  |
| Stage 2                  | 436    | -    | -      | -     | -      | -    |        |  |        |  |        |  |
| Platoon blocked, %       | -      | -    | -      | -     | -      | -    |        |  |        |  |        |  |
| Mov Cap-1 Maneuver       | 82     | 289  | -      | -     | 685    | -    |        |  |        |  |        |  |
| Mov Cap-2 Maneuver       | 82     | -    | -      | -     | -      | -    |        |  |        |  |        |  |
| Stage 1                  | 349    | -    | -      | -     | -      | -    |        |  |        |  |        |  |
| Stage 2                  | 429    | -    | -      | -     | -      | -    |        |  |        |  |        |  |
| Approach                 | WB     |      | NB     |       | SB     |      | SB     |  | SB     |  | SB     |  |
| HCM Control Delay, s     | 118.6  |      | 0      |       | 0.1    |      | 0.1    |  | 0.1    |  | 0.1    |  |
| HCM LOS                  | F      |      |        |       |        |      |        |  |        |  |        |  |
| Minor Lane/Major Mvmt    | NBT    |      | NBR    | WBLn1 | SBL    | SBT  | SBR    |  | SBR    |  | SBR    |  |
| Capacity (veh/h)         | -      |      | -      | 110   | 685    | -    | -      |  | -      |  | -      |  |
| HCM Lane V/C Ratio       | -      |      | -      | 0.84  | 0.016  | -    | -      |  | -      |  | -      |  |
| HCM Control Delay (s)    | -      |      | -      | 118.6 | 10.3   | -    | -      |  | -      |  | -      |  |
| HCM Lane LOS             | -      |      | -      | F     | B      | -    | -      |  | -      |  | -      |  |
| HCM 95th %ile Q(veh)     | -      |      | -      | 4.9   | 0      | -    | -      |  | -      |  | -      |  |

12239.00 :: Needham Street  
12: Needham Street & Rockland Street

2025 No Build Conditions  
Timing Plan: Weekday Evening

| Intersection             |        |       |        |       |       |      |
|--------------------------|--------|-------|--------|-------|-------|------|
| Int Delay, s/veh         | 0.4    |       |        |       |       |      |
| Movement                 | WBL    | WBR   | NBT    | NBR   | SBL   | SBT  |
| Lane Configurations      | ↵      |       | ↵      |       | ↵     | ↵    |
| Traffic Vol, veh/h       | 5      | 10    | 920    | 15    | 15    | 755  |
| Future Vol, veh/h        | 5      | 10    | 920    | 15    | 15    | 755  |
| Conflicting Peds, #/hr   | 1      | 0     | 0      | 7     | 7     | 0    |
| Sign Control             | Stop   | Stop  | Free   | Free  | Free  | Free |
| RT Channelized           | -      | None  | -      | None  | -     | None |
| Storage Length           | 0      | -     | -      | -     | 125   | -    |
| Veh in Median Storage, # | 0      | -     | 0      | -     | -     | 0    |
| Grade, %                 | 0      | -     | 0      | -     | -     | 0    |
| Peak Hour Factor         | 92     | 92    | 92     | 92    | 92    | 92   |
| Heavy Vehicles, %        | 0      | 0     | 1      | 1     | 1     | 1    |
| Mvmt Flow                | 5      | 11    | 1000   | 16    | 16    | 821  |
| Major/Minor              |        |       |        |       |       |      |
| Minor1                   | Major1 |       | Major2 |       |       |      |
| Conflicting Flow All     | 1869   | 1015  | 0      | 0     | 1023  | 0    |
| Stage 1                  | 1015   | -     | -      | -     | -     | -    |
| Stage 2                  | 854    | -     | -      | -     | -     | -    |
| Critical Hdwy            | 6.4    | 6.2   | -      | -     | 4.11  | -    |
| Critical Hdwy Stg 1      | 5.4    | -     | -      | -     | -     | -    |
| Critical Hdwy Stg 2      | 5.4    | -     | -      | -     | -     | -    |
| Follow-up Hdwy           | 3.5    | 3.3   | -      | -     | 2.209 | -    |
| Pot Cap-1 Maneuver       | 80     | 292   | -      | -     | 682   | -    |
| Stage 1                  | 353    | -     | -      | -     | -     | -    |
| Stage 2                  | 421    | -     | -      | -     | -     | -    |
| Platoon blocked, %       |        |       | -      | -     | -     | -    |
| Mov Cap-1 Maneuver       | 78     | 290   | -      | -     | 682   | -    |
| Mov Cap-2 Maneuver       | 78     | -     | -      | -     | -     | -    |
| Stage 1                  | 351    | -     | -      | -     | -     | -    |
| Stage 2                  | 411    | -     | -      | -     | -     | -    |
| Approach                 |        |       |        |       |       |      |
| WB                       | NB     |       | SB     |       |       |      |
| HCM Control Delay, s     | 31.5   | 0     | 0.2    |       |       |      |
| HCM LOS                  | D      |       |        |       |       |      |
| Minor Lane/Major Mvmt    |        |       |        |       |       |      |
| NBT                      | NBR    | WBLn1 | SBL    | SBT   |       |      |
| Capacity (veh/h)         | -      | -     | 152    | 682   | -     | -    |
| HCM Lane V/C Ratio       | -      | -     | 0.107  | 0.024 | -     | -    |
| HCM Control Delay (s)    | -      | -     | 31.5   | 10.4  | -     | -    |
| HCM Lane LOS             | -      | -     | D      | B     | -     | -    |
| HCM 95th %tile Q(veh)    | -      | -     | 0.4    | 0.1   | -     | -    |

12239.00 :: Needham Street  
13: Needham Street & Avalon Driveway/Columbia Avenue

2025 No Build Conditions  
Timing Plan: Weekday Evening

| Lane Group              | EBL   | EBT   | EBR   | WBL   | WBT   | WBR  | NBL   | NBT   | NBR  | SBL   | SBT   | SBR  | Ø1   | Ø3   | Ø5   | Ø7   |
|-------------------------|-------|-------|-------|-------|-------|------|-------|-------|------|-------|-------|------|------|------|------|------|
| Lane Configurations     |       | ↵     | ↵     |       | ↵     | ↵    |       | ↵     | ↵    | ↵     | ↵     |      |      |      |      |      |
| Traffic Volume (vph)    | 10    | 0     | 15    | 5     | 1     | 5    | 25    | 955   | 5    | 1     | 705   | 10   |      |      |      |      |
| Future Volume (vph)     | 10    | 0     | 15    | 5     | 1     | 5    | 25    | 955   | 5    | 1     | 705   | 10   |      |      |      |      |
| Ideal Flow (vph/pl)     | 1900  | 1900  | 1900  | 1900  | 1900  | 1900 | 1900  | 1900  | 1900 | 1900  | 1900  | 1900 |      |      |      |      |
| Storage Length (ft)     | 0     |       | 50    | 0     |       | 0    | 125   | 0     |      | 100   | 0     |      |      |      |      |      |
| Storage Lanes           | 0     |       | 1     | 0     |       | 0    | 1     | 0     |      | 1     | 0     |      |      |      |      |      |
| Taper Length (ft)       | 25    |       |       | 25    |       |      | 25    |       |      | 25    |       |      |      |      |      |      |
| Satd. Flow (prot)       | 0     | 1805  | 1615  | 0     | 1597  | 0    | 1787  | 1879  | 0    | 1787  | 1876  | 0    |      |      |      |      |
| Flt Permitted           |       |       |       |       |       |      | 0.314 |       |      | 0.164 |       |      |      |      |      |      |
| Satd. Flow (perm)       | 0     | 1889  | 1571  | 0     | 1627  | 0    | 591   | 1879  | 0    | 309   | 1876  | 0    |      |      |      |      |
| Right Turn on Red       |       | Yes   |       |       | Yes   |      |       | Yes   |      |       | Yes   |      |      |      |      |      |
| Satd. Flow (RTOR)       |       | 80    |       |       | 5     |      |       | 1     |      |       | 2     |      |      |      |      |      |
| Link Speed (mph)        | 30    |       |       | 30    |       |      | 30    |       |      | 30    |       |      |      |      |      |      |
| Link Distance (ft)      | 190   |       |       | 435   |       |      | 338   |       |      | 1135  |       |      |      |      |      |      |
| Travel Time (s)         | 4.3   |       |       | 9.9   |       |      | 7.7   |       |      | 25.8  |       |      |      |      |      |      |
| Confl. Peds. (#/hr)     | 2     |       | 2     | 2     |       | 2    | 9     |       | 5    | 5     |       | 9    |      |      |      |      |
| Peak Hour Factor        | 0.92  | 0.92  | 0.92  | 0.92  | 0.92  | 0.92 | 0.92  | 0.92  | 0.92 | 0.92  | 0.92  | 0.92 |      |      |      |      |
| Heavy Vehicles (%)      | 0%    | 0%    | 0%    | 8%    | 8%    | 8%   | 8%    | 1%    | 1%   | 1%    | 1%    | 1%   |      |      |      |      |
| Shared Lane Traffic (%) |       |       |       |       |       |      |       |       |      |       |       |      |      |      |      |      |
| Lane Group Flow (vph)   | 0     | 11    | 16    | 0     | 11    | 0    | 27    | 1043  | 0    | 1     | 777   | 0    |      |      |      |      |
| Turn Type               | Perm  | NA    | Perm  | Perm  | NA    | Perm | NA    | Perm  | NA   | Perm  | NA    |      |      |      |      |      |
| Protected Phases        |       | 4     |       |       | 8     |      |       | 2     |      |       | 6     |      | 1    | 3    | 5    | 7    |
| Permitted Phases        | 4     |       | 4     | 8     |       |      | 2     |       |      | 6     |       |      |      |      |      |      |
| Detector Phase          | 4     | 4     | 4     | 8     | 8     |      | 2     | 2     |      | 6     | 6     |      |      |      |      |      |
| Switch Phase            |       |       |       |       |       |      |       |       |      |       |       |      |      |      |      |      |
| Minimum Initial (s)     | 4.0   | 4.0   | 4.0   | 4.0   | 4.0   |      | 10.0  | 10.0  |      | 10.0  | 10.0  |      | 1.0  | 1.0  | 1.0  | 1.0  |
| Minimum Split (s)       | 19.0  | 19.0  | 19.0  | 22.0  | 22.0  |      | 16.0  | 16.0  |      | 20.0  | 20.0  |      | 3.0  | 3.0  | 3.0  | 3.0  |
| Total Split (s)         | 18.0  | 18.0  | 18.0  | 18.0  | 18.0  |      | 71.0  | 71.0  |      | 71.0  | 71.0  |      | 3.0  | 3.0  | 3.0  | 3.0  |
| Total Split (%)         | 18.9% | 18.9% | 18.9% | 18.9% | 18.9% |      | 74.7% | 74.7% |      | 74.7% | 74.7% |      | 3%   | 3%   | 3%   | 3%   |
| Yellow Time (s)         | 4.0   | 4.0   | 4.0   | 4.0   | 4.0   |      | 4.0   | 4.0   |      | 4.0   | 4.0   |      | 2.0  | 2.0  | 2.0  | 2.0  |
| All-Red Time (s)        | 2.0   | 2.0   | 2.0   | 2.0   | 2.0   |      | 2.0   | 2.0   |      | 2.0   | 2.0   |      | 0.0  | 0.0  | 0.0  | 0.0  |
| Lost Time Adjust (s)    | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   |      | 0.0   | 0.0   |      | 0.0   | 0.0   |      |      |      |      |      |
| Total Lost Time (s)     | 6.0   | 6.0   |       | 6.0   | 6.0   |      | 6.0   | 6.0   |      | 6.0   | 6.0   |      |      |      |      |      |
| Lead/Lag                | Lag   | Lag   | Lag   | Lag   | Lag   |      | Lag   | Lag   |      | Lag   | Lag   |      | Lead | Lead | Lead | Lead |
| Lead-Lag Optimize?      |       |       |       |       |       |      |       |       |      |       |       |      |      |      |      |      |
| Recall Mode             | None  | None  | None  | None  | None  |      | None  | None  |      | None  | None  |      | None | None | None | None |
| Act Effct Green (s)     | 8.0   | 8.0   |       | 7.9   | 39.0  |      | 39.0  | 39.0  |      | 39.0  | 39.0  |      |      |      |      |      |
| Actuated g/C Ratio      | 0.18  | 0.18  |       | 0.18  | 0.87  |      | 0.87  | 0.87  |      | 0.87  | 0.87  |      |      |      |      |      |
| v/c Ratio               | 0.03  | 0.05  |       | 0.04  | 0.05  |      | 0.64  | 0.00  |      | 0.48  |       |      |      |      |      |      |
| Control Delay           | 27.7  | 0.3   |       | 23.1  | 4.2   |      | 8.4   | 4.0   |      | 5.5   |       |      |      |      |      |      |
| Queue Delay             | 0.0   | 0.0   |       | 0.0   | 0.0   |      | 0.0   | 0.0   |      | 0.0   |       |      |      |      |      |      |
| Total Delay             | 27.7  | 0.3   |       | 23.1  | 4.2   |      | 8.4   | 4.0   |      | 5.5   |       |      |      |      |      |      |
| LOS                     | C     | A     |       | C     | A     |      | A     | A     |      | A     | A     |      |      |      |      |      |
| Approach Delay          | 11.4  |       |       | 23.1  |       |      | 8.3   |       |      | 5.5   |       |      |      |      |      |      |
| Approach LOS            | B     |       |       | C     |       |      | A     |       |      | A     |       |      |      |      |      |      |
| Queue Length 50th (ft)  | 1     | 0     |       | 1     | 0     |      | 0     | 0     |      | 0     | 0     |      |      |      |      |      |
| Queue Length 95th (ft)  | 22    | 0     |       | 19    | 16    |      | 688   | 2     |      | 373   |       |      |      |      |      |      |
| Internal Link Dist (ft) | 110   |       |       | 355   |       |      | 258   |       |      | 1055  |       |      |      |      |      |      |
| Turn Bay Length (ft)    |       | 50    |       |       | 125   |      |       | 100   |      |       |       |      |      |      |      |      |
| Base Capacity (vph)     | 762   | 681   |       | 659   | 550   |      | 1750  | 288   |      | 1747  |       |      |      |      |      |      |
| Starvation Cap Reductn  | 0     | 0     |       | 0     | 0     |      | 0     | 0     |      | 0     | 0     |      |      |      |      |      |
| Spillback Cap Reductn   | 0     | 0     |       | 0     | 0     |      | 0     | 0     |      | 0     | 0     |      |      |      |      |      |
| Storage Cap Reductn     | 0     | 0     |       | 0     | 0     |      | 0     | 0     |      | 0     | 0     |      |      |      |      |      |
| Reduced v/c Ratio       | 0.01  | 0.02  |       | 0.02  | 0.05  |      | 0.60  | 0.00  |      | 0.44  |       |      |      |      |      |      |

| Intersection Summary                    |                        |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|-----------------------------------------|------------------------|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|
| Area Type:                              | Other                  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Cycle Length: 95                        |                        |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Actuated Cycle Length: 44.8             |                        |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Natural Cycle: 80                       |                        |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Control Type: Actuated-Uncoordinated    |                        |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Maximum v/c Ratio: 0.64                 |                        |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Intersection Signal Delay: 7.3          | Intersection LOS: A    |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Intersection Capacity Utilization 66.3% | ICU Level of Service C |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Analysis Period (min) 15                |                        |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |

Splits and Phases: 13: Needham Street & Avalon Driveway/Columbia Avenue



12239.00 :: Needham Street  
14: Winchester Street & Needham Street/Dedham Street

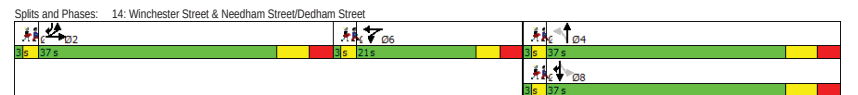
2025 No Build Conditions  
Timing Plan: Weekday Evening

| Lane Group              | EBL   | EBT   | EBR  | WBL   | WBT   | WBR  | NBL   | NBT   | NBR  | SBL   | SBT   | SBR   | Ø1   | Ø3   | Ø5   | Ø7   |
|-------------------------|-------|-------|------|-------|-------|------|-------|-------|------|-------|-------|-------|------|------|------|------|
| Lane Configurations     | ↰     | ↱     | ↲    | ↰     | ↱     | ↲    | ↰     | ↱     | ↲    | ↰     | ↱     | ↲     |      |      |      |      |
| Traffic Volume (vph)    | 760   | 120   | 45   | 20    | 90    | 85   | 20    | 345   | 15   | 65    | 305   | 570   |      |      |      |      |
| Future Volume (vph)     | 760   | 120   | 45   | 20    | 90    | 85   | 20    | 345   | 15   | 65    | 305   | 570   |      |      |      |      |
| Ideal Flow (vphpl)      | 1900  | 1900  | 1900 | 1900  | 1900  | 1900 | 1900  | 1900  | 1900 | 1900  | 1900  | 1900  |      |      |      |      |
| Storage Length (ft)     | 340   |       | 75   | 0     |       | 0    | 100   | 0     |      | 0     | 0     | 0     |      |      |      |      |
| Storage Lanes           | 1     |       | 1    | 0     |       | 0    | 1     | 0     |      | 0     | 0     | 1     |      |      |      |      |
| Taper Length (ft)       | 25    |       |      | 25    |       |      | 25    |       |      | 25    |       |       |      |      |      |      |
| Satd. Flow (prot)       | 3502  | 1822  | 0    | 0     | 1779  | 0    | 1805  | 1887  | 0    | 0     | 1864  | 1599  |      |      |      |      |
| Flt Permitted           | 0.950 |       |      |       | 0.995 |      | 0.346 |       |      |       | 0.633 |       |      |      |      |      |
| Satd. Flow (perm)       | 3502  | 1822  | 0    | 0     | 1779  | 0    | 653   | 1887  | 0    | 0     | 1191  | 1599  |      |      |      |      |
| Right Turn on Red       |       |       | Yes  |       |       | Yes  |       |       | No   |       |       | Yes   |      |      |      |      |
| Satd. Flow (RTOR)       |       | 18    |      |       | 31    |      |       |       |      |       |       | 560   |      |      |      |      |
| Link Speed (mph)        |       | 30    |      |       | 30    |      |       | 30    |      |       | 30    |       |      |      |      |      |
| Link Distance (ft)      |       | 1135  |      |       | 451   |      |       | 634   |      |       | 722   |       |      |      |      |      |
| Travel Time (s)         |       | 25.8  |      |       | 10.3  |      |       | 14.4  |      |       | 16.4  |       |      |      |      |      |
| Confl. Peds. (#/hr)     |       |       |      |       |       |      | 8     |       |      |       | 8     |       |      |      |      |      |
| Confl. Bikes (#/hr)     |       |       |      |       |       |      |       | 1     |      |       |       |       |      |      |      |      |
| Peak Hour Factor        | 0.92  | 0.92  | 0.92 | 0.92  | 0.92  | 0.92 | 0.92  | 0.92  | 0.92 | 0.92  | 0.92  | 0.92  |      |      |      |      |
| Heavy Vehicles (%)      | 0%    | 0%    | 0%   | 0%    | 0%    | 0%   | 0%    | 0%    | 0%   | 1%    | 1%    | 1%    |      |      |      |      |
| Shared Lane Traffic (%) |       |       |      |       |       |      |       |       |      |       |       |       |      |      |      |      |
| Lane Group Flow (vph)   | 826   | 179   | 0    | 0     | 212   | 0    | 22    | 391   | 0    | 0     | 403   | 620   |      |      |      |      |
| Turn Type               | Split | NA    |      | Split | NA    |      | Perm  | NA    |      | Perm  | NA    | pt+ov |      |      |      |      |
| Protected Phases        | 2     | 2     |      | 6     | 6     |      |       | 4     |      |       | 8     | 2 8   | 1    | 3    | 5    | 7    |
| Permitted Phases        |       |       |      |       |       |      | 4     |       |      | 8     |       |       |      |      |      |      |
| Detector Phase          | 2     | 2     |      | 6     | 6     |      | 4     | 4     |      | 8     | 8     | 2 8   |      |      |      |      |
| Switch Phase            |       |       |      |       |       |      |       |       |      |       |       |       |      |      |      |      |
| Minimum Initial (s)     | 10.0  | 10.0  |      | 6.0   | 6.0   |      | 6.0   | 6.0   |      | 6.0   | 6.0   |       | 1.0  | 1.0  | 1.0  | 1.0  |
| Minimum Split (s)       | 17.0  | 17.0  |      | 19.0  | 19.0  |      | 20.0  | 20.0  |      | 36.0  | 36.0  |       | 3.0  | 3.0  | 3.0  | 3.0  |
| Total Split (s)         | 37.0  | 37.0  |      | 21.0  | 21.0  |      | 37.0  | 37.0  |      | 37.0  | 37.0  |       | 3.0  | 3.0  | 3.0  | 3.0  |
| Total Split (%)         | 35.6% | 35.6% |      | 20.2% | 20.2% |      | 35.6% | 35.6% |      | 35.6% | 35.6% |       | 3%   | 3%   | 3%   | 3%   |
| Yellow Time (s)         | 4.0   | 4.0   |      | 3.0   | 3.0   |      | 4.0   | 4.0   |      | 4.0   | 4.0   |       | 2.0  | 2.0  | 2.0  | 2.0  |
| All-Red Time (s)        | 3.0   | 3.0   |      | 3.0   | 3.0   |      | 3.0   | 3.0   |      | 3.0   | 3.0   |       | 0.0  | 0.0  | 0.0  | 0.0  |
| Lost Time Adjust (s)    | 0.0   | 0.0   |      | 0.0   | 0.0   |      | 0.0   | 0.0   |      | 0.0   | 0.0   |       |      |      |      |      |
| Total Lost Time (s)     | 7.0   | 7.0   |      | 6.0   | 6.0   |      | 7.0   | 7.0   |      | 7.0   | 7.0   |       |      |      |      |      |
| Lead/Lag                | Lag   | Lag   |      | Lag   | Lag   |      | Lag   | Lag   |      | Lag   | Lag   |       | Lead | Lead | Lead | Lead |
| Lead-Lag Optimize?      |       |       |      |       |       |      |       |       |      |       |       |       |      |      |      |      |
| Recall Mode             | None  | None  |      | None  | None  |      | None  | None  |      | None  | None  |       | None | None | None | None |
| Act Effct Green (s)     | 27.7  | 27.7  |      | 12.9  | 12.9  |      | 30.7  | 30.7  |      | 30.2  | 64.9  |       |      |      |      |      |
| Actuated g/C Ratio      | 0.30  | 0.30  |      | 0.14  | 0.14  |      | 0.34  | 0.34  |      | 0.33  | 0.71  |       |      |      |      |      |
| v/c Ratio               | 0.78  | 0.32  |      | 0.77  | 0.10  |      | 0.62  | 0.62  |      | 1.03  | 0.48  |       |      |      |      |      |
| Control Delay           | 35.3  | 24.1  |      | 51.7  | 24.2  |      | 31.5  | 31.5  |      | 85.9  | 2.1   |       |      |      |      |      |
| Queue Delay             | 0.0   | 0.0   |      | 0.0   | 0.0   |      | 0.0   | 0.0   |      | 0.0   | 0.0   |       |      |      |      |      |
| Total Delay             | 35.3  | 24.1  |      | 51.7  | 24.2  |      | 31.5  | 31.5  |      | 85.9  | 2.1   |       |      |      |      |      |
| LOS                     | D     | C     |      | D     | C     |      | C     | C     |      | F     | A     |       |      |      |      |      |
| Approach Delay          |       | 33.3  |      |       | 51.7  |      |       | 31.1  |      |       | 35.1  |       |      |      |      |      |
| Approach LOS            |       | C     |      |       | D     |      |       | C     |      |       | D     |       |      |      |      |      |
| Queue Length 50th (ft)  | 226   | 72    |      |       | 104   |      | 9     | 201   |      |       | ~270  | 9     |      |      |      |      |
| Queue Length 95th (ft)  | 311   | 133   |      |       | #207  |      | 28    | 301   |      |       | #471  | 45    |      |      |      |      |
| Internal Link Dist (ft) |       | 1055  |      |       | 371   |      |       | 554   |      |       | 642   |       |      |      |      |      |
| Turn Bay Length (ft)    | 340   |       |      |       |       |      | 100   |       |      |       |       |       |      |      |      |      |
| Base Capacity (vph)     | 1156  | 614   |      |       | 319   |      | 219   | 634   |      |       | 393   | 1326  |      |      |      |      |
| Starvation Cap Reductn  | 0     | 0     |      |       | 0     |      | 0     | 0     |      |       | 0     | 0     |      |      |      |      |
| Spillback Cap Reductn   | 0     | 0     |      |       | 0     |      | 0     | 0     |      |       | 0     | 0     |      |      |      |      |
| Storage Cap Reductn     | 0     | 0     |      |       | 0     |      | 0     | 0     |      |       | 0     | 0     |      |      |      |      |
| Reduced v/c Ratio       | 0.71  | 0.29  |      |       | 0.66  |      | 0.10  | 0.62  |      |       | 1.03  | 0.47  |      |      |      |      |

| Intersection Summary                                            |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|-----------------------------------------------------------------|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|
| Area Type: Other                                                |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Cycle Length: 104                                               |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Actuated Cycle Length: 91.4                                     |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Natural Cycle: 95                                               |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Control Type: Actuated-Uncoordinated                            |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Maximum v/c Ratio: 1.03                                         |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Intersection Signal Delay: 35.1                                 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Intersection Capacity Utilization 95.0%                         |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Analysis Period (min) 15                                        |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| - Volume exceeds capacity, queue is theoretically infinite.     |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Queue shown is maximum after two cycles.                        |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| # 95th percentile volume exceeds capacity, queue may be longer. |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Queue shown is maximum after two cycles.                        |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |

12239.00 :: Needham Street  
14: Winchester Street & Needham Street/Dedham Street

2025 No Build Conditions  
Timing Plan: Weekday Evening



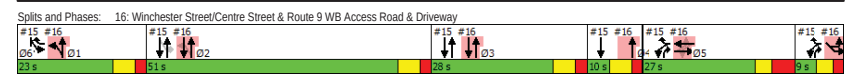
| Intersection Summary               |                                                                 |
|------------------------------------|-----------------------------------------------------------------|
| Area Type:                         | Other                                                           |
| Cycle Length:                      | 148                                                             |
| Actuated Cycle Length:             | 146.5                                                           |
| Natural Cycle:                     | 125                                                             |
| Control Type:                      | Actuated-Uncoordinated                                          |
| Maximum v/c Ratio:                 | 1.25                                                            |
| Intersection Signal Delay:         | 69.8                                                            |
| Intersection Capacity Utilization: | 78.5%                                                           |
| Analysis Period (min):             | 15                                                              |
| ~                                  | Volume exceeds capacity, queue is theoretically infinite.       |
|                                    | Queue shown is maximum after two cycles.                        |
| #                                  | 95th percentile volume exceeds capacity, queue may be longer.   |
|                                    | Queue shown is maximum after two cycles.                        |
| m                                  | Volume for 95th percentile queue is metered by upstream signal. |

## Timing Plan: Weekday Evening

| Intersection Summary                                                                                                                                                                                                                                                                                                   |                        |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------|
| Area Type:                                                                                                                                                                                                                                                                                                             | Other                  |
| Cycle Length:                                                                                                                                                                                                                                                                                                          | 148                    |
| Actuated Cycle Length:                                                                                                                                                                                                                                                                                                 | 146.5                  |
| Natural Cycle:                                                                                                                                                                                                                                                                                                         | 125                    |
| Control Type:                                                                                                                                                                                                                                                                                                          | Actuated-Uncoordinated |
| Maximum v/c Ratio:                                                                                                                                                                                                                                                                                                     | 1.25                   |
| Intersection Signal Delay:                                                                                                                                                                                                                                                                                             | 90.0                   |
| Intersection Capacity Utilization:                                                                                                                                                                                                                                                                                     | 102.4%                 |
| Analysis Period (min):                                                                                                                                                                                                                                                                                                 | 15                     |
| <p># Volume exceeds capacity, queue is theoretically infinite.</p> <p># Queue shown is maximum after two cycles.</p> <p># 95th percentile volume exceeds capacity, queue may be longer.</p> <p># Queue shown is maximum after two cycles.</p> <p>m Volume for 95th percentile queue is metered by upstream signal.</p> |                        |
| Intersection LOS:                                                                                                                                                                                                                                                                                                      | F                      |
| ICU Level of Service:                                                                                                                                                                                                                                                                                                  | G                      |

Lanes, Volumes, Timings  
VHB/MSD

Timing Plan: Weekday Evening



Lanes, Volumes, Timings  
VHB/MSD



12239.00 :: Needham Street  
17: Centre Street & Walnut Street

2025 No Build Conditions  
Timing Plan: Weekday Evening

| Lane Group              | SEL   | SET   | SER   | NWL   | NWT   | NWR  | NEL   | NET  | NER   | SWL   | SWT   | SWR  | Ø3 |
|-------------------------|-------|-------|-------|-------|-------|------|-------|------|-------|-------|-------|------|----|
| Lane Configurations     |       | ↔     | ↔     |       | ↔     |      | ↔     | ↔    |       | ↔     | ↔     |      |    |
| Traffic Volume (vph)    | 30    | 2     | 425   | 15    | 50    | 0    | 415   | 585  | 10    | 2     | 610   | 60   |    |
| Future Volume (vph)     | 30    | 2     | 425   | 15    | 50    | 0    | 415   | 585  | 10    | 2     | 610   | 60   |    |
| Ideal Flow (vphpl)      | 1900  | 1900  | 1900  | 1900  | 1900  | 1900 | 1900  | 1900 | 1900  | 1900  | 1900  | 1900 |    |
| Storage Length (ft)     | 0     |       | 50    | 0     |       | 0    | 75    |      | 0     |       | 0     | 0    |    |
| Storage Lanes           | 0     |       | 1     | 0     |       | 0    | 1     |      | 0     |       | 0     | 0    |    |
| Taper Length (ft)       | 25    |       |       | 25    |       |      | 25    |      |       | 25    |       |      |    |
| Satd. Flow (prot)       | 0     | 1814  | 1615  | 0     | 1879  | 0    | 1787  | 1875 | 0     | 0     | 1854  | 0    |    |
| Flt Permitted           |       | 0.740 |       |       | 0.919 |      | 0.224 |      |       |       | 0.999 |      |    |
| Satd. Flow (perm)       | 0     | 1360  | 1558  | 0     | 1731  | 0    | 421   | 1875 | 0     | 0     | 1853  | 0    |    |
| Right Turn on Red       |       |       | No    |       | No    |      |       | Yes  |       |       | Yes   |      |    |
| Satd. Flow (RTOR)       |       |       |       |       |       |      |       | 1    |       |       | 5     |      |    |
| Link Speed (mph)        |       | 30    |       |       | 30    |      |       | 30   |       |       | 30    |      |    |
| Link Distance (ft)      |       | 624   |       |       | 387   |      |       | 508  |       |       | 531   |      |    |
| Travel Time (s)         |       | 14.2  |       |       | 8.8   |      |       | 11.5 |       |       | 12.1  |      |    |
| Confl. Peds. (#/hr)     | 11    |       | 10    | 10    |       | 11   | 4     |      | 8     | 8     |       | 4    |    |
| Peak Hour Factor        | 0.92  | 0.92  | 0.92  | 0.92  | 0.92  | 0.92 | 0.92  | 0.92 | 0.92  | 0.92  | 0.92  | 0.92 |    |
| Heavy Vehicles (%)      | 0%    | 0%    | 0%    | 0%    | 0%    | 0%   | 1%    | 1%   | 1%    | 1%    | 1%    | 1%   |    |
| Shared Lane Traffic (%) |       |       |       |       |       |      |       |      |       |       |       |      |    |
| Lane Group Flow (vph)   | 0     | 35    | 462   | 0     | 70    | 0    | 451   | 647  | 0     | 0     | 730   | 0    |    |
| Turn Type               | Perm  | NA    | pm+ov | Perm  | NA    |      | D,P+P | NA   |       | Perm  | NA    |      |    |
| Protected Phases        |       | 4     | 1     |       | 4     |      | 1     | 12   |       |       | 2     |      | 3  |
| Permitted Phases        | 4     |       | 4     |       | 4     |      | 2     |      |       | 2     |       |      |    |
| Detector Phase          | 4     | 4     | 1     | 4     | 4     |      | 1     | 12   |       | 2     | 2     |      |    |
| Switch Phase            |       |       |       |       |       |      |       |      |       |       |       |      |    |
| Minimum Initial (s)     | 9.0   | 9.0   | 7.0   | 9.0   | 9.0   |      | 7.0   |      | 6.0   | 6.0   |       | 4.0  |    |
| Minimum Split (s)       | 14.0  | 14.0  | 12.0  | 14.0  | 14.0  |      | 12.0  |      | 11.0  | 11.0  |       | 19.0 |    |
| Total Split (s)         | 19.0  | 19.0  | 25.0  | 19.0  | 19.0  |      | 25.0  |      | 45.0  | 45.0  |       | 19.0 |    |
| Total Split (%)         | 17.6% | 17.6% | 23.1% | 17.6% | 17.6% |      | 23.1% |      | 41.7% | 41.7% |       | 18%  |    |
| Yellow Time (s)         | 4.0   | 4.0   | 4.0   | 4.0   | 4.0   |      | 4.0   |      | 4.0   | 4.0   |       | 4.0  |    |
| All-Red Time (s)        | 1.0   | 1.0   | 1.0   | 1.0   | 1.0   |      | 1.0   |      | 1.0   | 1.0   |       | 0.0  |    |
| Lost Time Adjust (s)    | 0.0   | 0.0   |       | 0.0   | 0.0   |      | 0.0   |      | 0.0   | 0.0   |       |      |    |
| Total Lost Time (s)     | 5.0   | 5.0   |       | 5.0   | 5.0   |      | 5.0   |      |       | 5.0   |       |      |    |
| Lead/Lag                | Lag   | Lag   | Lead  | Lag   | Lag   | Lead |       |      | Lag   | Lag   | Lead  |      |    |
| Lead-Lag Optimize?      |       |       |       |       |       |      |       |      |       |       |       |      |    |
| Recall Mode             | Min   | Min   | Max   | Min   | Min   | Max  |       |      | Max   | Max   |       | None |    |
| Act Effct Green (s)     | 9.9   | 30.1  |       | 9.9   | 60.7  | 65.8 |       |      | 40.5  |       |       |      |    |
| Actuated g/C Ratio      | 0.10  | 0.31  |       | 0.10  | 0.63  | 0.68 |       |      | 0.42  |       |       |      |    |
| v/c Ratio               | 0.25  | 0.93  |       | 0.40  | 0.82  | 0.51 |       |      | 0.93  |       |       |      |    |
| Control Delay           | 47.6  | 59.0  |       | 50.1  | 29.4  | 11.0 |       |      | 49.4  |       |       |      |    |
| Queue Delay             | 0.0   | 0.0   |       | 0.0   | 0.0   | 1.0  |       |      | 0.0   |       |       |      |    |
| Total Delay             | 47.6  | 59.0  |       | 50.1  | 29.4  | 11.9 |       |      | 49.4  |       |       |      |    |
| LOS                     | D     | E     |       | D     | C     | B    |       |      | D     |       |       |      |    |
| Approach Delay          | 58.1  |       |       | 50.1  |       | 19.1 |       |      | 49.4  |       |       |      |    |
| Approach LOS            | E     |       |       | D     |       | B    |       |      | D     |       |       |      |    |
| Queue Length 50th (ft)  | 22    | ~294  |       | 45    | 166   | 219  |       |      | ~482  |       |       |      |    |
| Queue Length 95th (ft)  | 54    | #510  |       | 89    | #371  | 343  |       |      | #770  |       |       |      |    |
| Internal Link Dist (ft) | 544   |       |       | 307   |       | 428  |       |      | 451   |       |       |      |    |
| Turn Bay Length (ft)    |       | 50    |       |       | 75    |      |       |      |       |       |       |      |    |
| Base Capacity (vph)     | 200   | 499   |       | 254   | 552   | 1281 |       |      | 781   |       |       |      |    |
| Starvation Cap Reductn  | 0     | 0     |       | 0     | 0     | 363  |       |      | 0     |       |       |      |    |
| Spillback Cap Reductn   | 0     | 0     |       | 0     | 0     | 0    |       |      | 0     |       |       |      |    |
| Storage Cap Reductn     | 0     | 0     |       | 0     | 0     | 0    |       |      | 0     |       |       |      |    |
| Reduced v/c Ratio       | 0.17  | 0.93  |       | 0.28  | 0.82  | 0.70 |       |      | 0.93  |       |       |      |    |

| Intersection Summary                                            |                        |  |
|-----------------------------------------------------------------|------------------------|--|
| Area Type:                                                      | Other                  |  |
| Cycle Length: 108                                               |                        |  |
| Actuated Cycle Length: 96.3                                     |                        |  |
| Natural Cycle: 100                                              |                        |  |
| Control Type: Semi Act-Uncoord                                  |                        |  |
| Maximum v/c Ratio: 0.93                                         |                        |  |
| Intersection Signal Delay: 37.3                                 | Intersection LOS: D    |  |
| Intersection Capacity Utilization 89.9%                         | ICU Level of Service E |  |
| Analysis Period (min) 15                                        |                        |  |
| ~ Volume exceeds capacity, queue is theoretically infinite.     |                        |  |
| Queue shown is maximum after two cycles.                        |                        |  |
| # 95th percentile volume exceeds capacity, queue may be longer. |                        |  |
| Queue shown is maximum after two cycles.                        |                        |  |

12239.00 :: Needham Street  
17: Centre Street & Walnut Street

2025 No Build Conditions  
Timing Plan: Weekday Evening



12239.00 :: Needham Street  
18: Nahanton Street & Winchester Street

2025 No Build Conditions  
Timing Plan: Weekday Evening

| Lane Group              | EBL                                                                               | EBT                                                                               | WBT                                                                               | WBR                                                                               | SBL                                                                               | SBR                                                                               |
|-------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|
| Lane Configurations     |  |  |  |  |  |  |
| Traffic Volume (vph)    | 395                                                                               | 645                                                                               | 470                                                                               | 30                                                                                | 65                                                                                | 345                                                                               |
| Future Volume (vph)     | 395                                                                               | 645                                                                               | 470                                                                               | 30                                                                                | 65                                                                                | 345                                                                               |
| Ideal Flow (vph/pl)     | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                              |
| Storage Length (ft)     | 175                                                                               |                                                                                   |                                                                                   | 0                                                                                 | 75                                                                                | 0                                                                                 |
| Storage Lanes           | 1                                                                                 |                                                                                   |                                                                                   | 0                                                                                 | 1                                                                                 |                                                                                   |
| Taper Length (ft)       | 25                                                                                |                                                                                   |                                                                                   |                                                                                   | 25                                                                                |                                                                                   |
| Satd. Flow (prot)       | 1805                                                                              | 1900                                                                              | 1885                                                                              | 0                                                                                 | 1805                                                                              | 1615                                                                              |
| Flt Permitted           | 0.304                                                                             |                                                                                   |                                                                                   |                                                                                   | 0.950                                                                             |                                                                                   |
| Satd. Flow (perm)       | 578                                                                               | 1900                                                                              | 1885                                                                              | 0                                                                                 | 1805                                                                              | 1615                                                                              |
| Right Turn on Red       |                                                                                   |                                                                                   |                                                                                   | Yes                                                                               |                                                                                   | No                                                                                |
| Satd. Flow (RTOR)       |                                                                                   |                                                                                   | 4                                                                                 |                                                                                   |                                                                                   |                                                                                   |
| Link Speed (mph)        |                                                                                   | 30                                                                                | 30                                                                                |                                                                                   | 30                                                                                |                                                                                   |
| Link Distance (ft)      |                                                                                   | 963                                                                               | 734                                                                               |                                                                                   | 889                                                                               |                                                                                   |
| Travel Time (s)         |                                                                                   | 21.9                                                                              | 16.7                                                                              |                                                                                   | 20.2                                                                              |                                                                                   |
| Peak Hour Factor        | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              |
| Heavy Vehicles (%)      | 0%                                                                                | 0%                                                                                | 0%                                                                                | 0%                                                                                | 0%                                                                                | 0%                                                                                |
| Shared Lane Traffic (%) |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| Lane Group Flow (vph)   | 429                                                                               | 701                                                                               | 544                                                                               | 0                                                                                 | 71                                                                                | 375                                                                               |
| Turn Type               | pm+pt                                                                             | NA                                                                                | NA                                                                                |                                                                                   | Prot                                                                              | pt+ov                                                                             |
| Protected Phases        | 5                                                                                 | 2                                                                                 | 6                                                                                 |                                                                                   | 8                                                                                 | 5/8                                                                               |
| Permitted Phases        | 2                                                                                 |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| Detector Phase          | 5                                                                                 | 2                                                                                 | 6                                                                                 |                                                                                   | 8                                                                                 | 5/8                                                                               |
| Switch Phase            |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| Minimum Initial (s)     | 6.0                                                                               | 10.0                                                                              | 10.0                                                                              |                                                                                   | 6.0                                                                               |                                                                                   |
| Minimum Split (s)       | 11.0                                                                              | 15.0                                                                              | 23.0                                                                              |                                                                                   | 10.0                                                                              |                                                                                   |
| Total Split (s)         | 33.0                                                                              | 104.0                                                                             | 71.0                                                                              |                                                                                   | 16.0                                                                              |                                                                                   |
| Total Split (%)         | 27.5%                                                                             | 86.7%                                                                             | 59.2%                                                                             |                                                                                   | 13.3%                                                                             |                                                                                   |
| Yellow Time (s)         | 3.0                                                                               | 3.0                                                                               | 3.0                                                                               |                                                                                   | 3.0                                                                               |                                                                                   |
| All-Red Time (s)        | 2.0                                                                               | 2.0                                                                               | 2.0                                                                               |                                                                                   | 1.0                                                                               |                                                                                   |
| Lost Time Adjust (s)    | 0.0                                                                               | 0.0                                                                               | 0.0                                                                               |                                                                                   | 0.0                                                                               |                                                                                   |
| Total Lost Time (s)     | 5.0                                                                               | 5.0                                                                               | 5.0                                                                               |                                                                                   | 4.0                                                                               |                                                                                   |
| Lead/Lag                | Lead                                                                              |                                                                                   | Lag                                                                               |                                                                                   |                                                                                   |                                                                                   |
| Lead-Lag Optimize?      | Yes                                                                               |                                                                                   | Yes                                                                               |                                                                                   |                                                                                   |                                                                                   |
| Recall Mode             | None                                                                              | C-Min                                                                             | None                                                                              |                                                                                   | None                                                                              |                                                                                   |
| Act Effct Green (s)     | 86.8                                                                              | 86.8                                                                              | 64.8                                                                              |                                                                                   | 24.2                                                                              | 45.2                                                                              |
| Actuated g/C Ratio      | 0.72                                                                              | 0.72                                                                              | 0.54                                                                              |                                                                                   | 0.20                                                                              | 0.38                                                                              |
| v/c Ratio               | 0.73                                                                              | 0.51                                                                              | 0.53                                                                              |                                                                                   | 0.20                                                                              | 0.62                                                                              |
| Control Delay           | 13.9                                                                              | 9.0                                                                               | 21.2                                                                              |                                                                                   | 41.0                                                                              | 34.7                                                                              |
| Queue Delay             | 0.0                                                                               | 0.0                                                                               | 0.0                                                                               |                                                                                   | 0.0                                                                               | 0.0                                                                               |
| Total Delay             | 13.9                                                                              | 9.0                                                                               | 21.2                                                                              |                                                                                   | 41.0                                                                              | 34.7                                                                              |
| LOS                     | B                                                                                 | A                                                                                 | C                                                                                 |                                                                                   | D                                                                                 | C                                                                                 |
| Approach Delay          |                                                                                   | 10.9                                                                              | 21.2                                                                              |                                                                                   | 35.7                                                                              |                                                                                   |
| Approach LOS            |                                                                                   | B                                                                                 | C                                                                                 |                                                                                   | D                                                                                 |                                                                                   |
| Queue Length 50th (ft)  |                                                                                   | 115                                                                               | 226                                                                               | 273                                                                               | 45                                                                                | 225                                                                               |
| Queue Length 95th (ft)  |                                                                                   | 138                                                                               | 264                                                                               | 380                                                                               | 91                                                                                | 327                                                                               |
| Internal Link Dist (ft) |                                                                                   |                                                                                   | 883                                                                               | 654                                                                               | 809                                                                               |                                                                                   |
| Turn Bay Length (ft)    |                                                                                   | 175                                                                               |                                                                                   |                                                                                   | 75                                                                                |                                                                                   |
| Base Capacity (vph)     |                                                                                   | 704                                                                               | 1567                                                                              | 1073                                                                              | 364                                                                               | 756                                                                               |
| Starvation Cap Reductn  |                                                                                   | 0                                                                                 | 0                                                                                 | 0                                                                                 | 0                                                                                 | 0                                                                                 |
| Spillback Cap Reductn   |                                                                                   | 0                                                                                 | 0                                                                                 | 0                                                                                 | 0                                                                                 | 0                                                                                 |
| Storage Cap Reductn     |                                                                                   | 0                                                                                 | 0                                                                                 | 0                                                                                 | 0                                                                                 | 0                                                                                 |
| Reduced v/c Ratio       |                                                                                   | 0.61                                                                              | 0.45                                                                              | 0.51                                                                              | 0.20                                                                              | 0.50                                                                              |

Intersection Summary

Area Type: Other  
Cycle Length: 120  
Actuated Cycle Length: 120  
Offset: 8 (7%), Referenced to phase 2:EBTL, Start of Green  
Natural Cycle: 60  
Control Type: Actuated-Coordinated  
Maximum v/c Ratio: 0.73  
Intersection Signal Delay: 18.8  
Intersection Capacity Utilization 65.1%  
Analysis Period (min) 15

Splits and Phases: 18: Nahanton Street & Winchester Street



Lanes, Volumes, Timings  
VHB/MSD  
\\hbl\proj\Wat-LD\12239.00\tech\Traffic\Synchro\TIA\_2018\2025 NB\_PM.syn  
07/03/2018

12239.00 :: Needham Street  
19: Wells Avenue/JCC Driveway & Nahanton Street

2025 No Build Conditions  
Timing Plan: Weekday Evening

| Lane Group              | EBL                                                                                 | EBT                                                                                 | EBR                                                                                 | WBL                                                                                 | WBT                                                                                 | WBR                                                                                 | NBL                                                                                 | NBT                                                                                 | NBR                                                                                 | SBL                                                                                 | SBT                                                                                 | SBR                                                                                 |
|-------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
| Lane Configurations     |  |  |  |  |  |  |  |  |  |  |  |  |
| Traffic Volume (vph)    | 45                                                                                  | 525                                                                                 | 125                                                                                 | 170                                                                                 | 585                                                                                 | 60                                                                                  | 510                                                                                 | 20                                                                                  | 400                                                                                 | 115                                                                                 | 2                                                                                   | 60                                                                                  |
| Future Volume (vph)     | 45                                                                                  | 525                                                                                 | 125                                                                                 | 170                                                                                 | 585                                                                                 | 60                                                                                  | 510                                                                                 | 20                                                                                  | 400                                                                                 | 115                                                                                 | 2                                                                                   | 60                                                                                  |
| Ideal Flow (vph/pl)     | 1900                                                                                | 1900                                                                                | 1900                                                                                | 1900                                                                                | 1900                                                                                | 1900                                                                                | 1900                                                                                | 1900                                                                                | 1900                                                                                | 1900                                                                                | 1900                                                                                | 1900                                                                                |
| Storage Length (ft)     | 125                                                                                 |                                                                                     |                                                                                     | 125                                                                                 | 150                                                                                 |                                                                                     | 0                                                                                   | 0                                                                                   | 0                                                                                   | 75                                                                                  |                                                                                     | 0                                                                                   |
| Storage Lanes           | 1                                                                                   |                                                                                     |                                                                                     | 1                                                                                   |                                                                                     |                                                                                     | 0                                                                                   | 1                                                                                   |                                                                                     | 0                                                                                   |                                                                                     | 1                                                                                   |
| Taper Length (ft)       | 25                                                                                  |                                                                                     |                                                                                     | 25                                                                                  |                                                                                     |                                                                                     | 25                                                                                  |                                                                                     |                                                                                     | 25                                                                                  |                                                                                     |                                                                                     |
| Satd. Flow (prot)       | 1787                                                                                | 1881                                                                                | 1599                                                                                | 1805                                                                                | 1870                                                                                | 0                                                                                   | 1805                                                                                | 1628                                                                                | 0                                                                                   | 1805                                                                                | 1623                                                                                | 0                                                                                   |
| Flt Permitted           | 0.133                                                                               |                                                                                     |                                                                                     | 0.133                                                                               |                                                                                     |                                                                                     | 0.713                                                                               |                                                                                     |                                                                                     | 0.332                                                                               |                                                                                     |                                                                                     |
| Satd. Flow (perm)       | 250                                                                                 | 1881                                                                                | 1565                                                                                | 253                                                                                 | 1870                                                                                | 0                                                                                   | 1355                                                                                | 1628                                                                                | 0                                                                                   | 631                                                                                 | 1623                                                                                | 0                                                                                   |
| Right Turn on Red       |                                                                                     |                                                                                     | Yes                                                                                 |                                                                                     |                                                                                     | Yes                                                                                 |                                                                                     |                                                                                     | Yes                                                                                 |                                                                                     |                                                                                     | Yes                                                                                 |
| Satd. Flow (RTOR)       |                                                                                     |                                                                                     | 80                                                                                  |                                                                                     | 6                                                                                   |                                                                                     |                                                                                     | 348                                                                                 |                                                                                     |                                                                                     | 65                                                                                  |                                                                                     |
| Link Speed (mph)        |                                                                                     | 30                                                                                  |                                                                                     |                                                                                     | 30                                                                                  |                                                                                     |                                                                                     | 30                                                                                  |                                                                                     |                                                                                     | 30                                                                                  |                                                                                     |
| Link Distance (ft)      |                                                                                     | 797                                                                                 |                                                                                     |                                                                                     | 963                                                                                 |                                                                                     |                                                                                     | 598                                                                                 |                                                                                     |                                                                                     | 628                                                                                 |                                                                                     |
| Travel Time (s)         |                                                                                     | 18.1                                                                                |                                                                                     |                                                                                     | 21.9                                                                                |                                                                                     |                                                                                     | 13.6                                                                                |                                                                                     |                                                                                     | 14.3                                                                                |                                                                                     |
| Confli. Peds. (#/hr)    | 1                                                                                   |                                                                                     | 1                                                                                   | 1                                                                                   |                                                                                     |                                                                                     | 1                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Peak Hour Factor        | 0.92                                                                                | 0.92                                                                                | 0.92                                                                                | 0.92                                                                                | 0.92                                                                                | 0.92                                                                                | 0.92                                                                                | 0.92                                                                                | 0.92                                                                                | 0.92                                                                                | 0.92                                                                                | 0.92                                                                                |
| Heavy Vehicles (%)      | 1%                                                                                  | 1%                                                                                  | 1%                                                                                  | 0%                                                                                  | 0%                                                                                  | 0%                                                                                  | 0%                                                                                  | 0%                                                                                  | 0%                                                                                  | 0%                                                                                  | 0%                                                                                  | 0%                                                                                  |
| Shared Lane Traffic (%) |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Lane Group Flow (vph)   | 49                                                                                  | 571                                                                                 | 136                                                                                 | 185                                                                                 | 701                                                                                 | 0                                                                                   | 554                                                                                 | 457                                                                                 | 0                                                                                   | 125                                                                                 | 67                                                                                  | 0                                                                                   |
| Turn Type               | pm+pt                                                                               | NA                                                                                  | Perm                                                                                | pm+pt                                                                               | NA                                                                                  |                                                                                     | Perm                                                                                | NA                                                                                  |                                                                                     | Perm                                                                                | NA                                                                                  |                                                                                     |
| Protected Phases        | 3                                                                                   | 1                                                                                   |                                                                                     | 3                                                                                   | 1                                                                                   |                                                                                     |                                                                                     | 2                                                                                   |                                                                                     |                                                                                     | 2                                                                                   |                                                                                     |
| Permitted Phases        | 1                                                                                   |                                                                                     | 1                                                                                   | 1                                                                                   |                                                                                     |                                                                                     | 2                                                                                   |                                                                                     |                                                                                     | 2                                                                                   |                                                                                     |                                                                                     |
| Detector Phase          | 3                                                                                   | 1                                                                                   | 1                                                                                   | 3                                                                                   | 1                                                                                   |                                                                                     | 2                                                                                   | 2                                                                                   |                                                                                     | 2                                                                                   | 2                                                                                   |                                                                                     |
| Switch Phase            |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Minimum Initial (s)     | 6.0                                                                                 | 6.0                                                                                 | 6.0                                                                                 | 6.0                                                                                 | 6.0                                                                                 |                                                                                     | 6.0                                                                                 | 6.0                                                                                 |                                                                                     | 6.0                                                                                 | 6.0                                                                                 |                                                                                     |
| Minimum Split (s)       | 10.0                                                                                | 11.0                                                                                | 11.0                                                                                | 10.0                                                                                | 11.0                                                                                |                                                                                     | 11.0                                                                                | 11.0                                                                                |                                                                                     | 11.0                                                                                | 11.0                                                                                |                                                                                     |
| Total Split (s)         | 14.0                                                                                | 35.0                                                                                | 35.0                                                                                | 14.0                                                                                | 35.0                                                                                |                                                                                     | 45.0                                                                                | 45.0                                                                                |                                                                                     | 45.0                                                                                | 45.0                                                                                |                                                                                     |
| Total Split (%)         | 14.9%                                                                               | 37.2%                                                                               | 37.2%                                                                               | 14.9%                                                                               | 37.2%                                                                               |                                                                                     | 47.9%                                                                               | 47.9%                                                                               |                                                                                     | 47.9%                                                                               | 47.9%                                                                               |                                                                                     |
| Yellow Time (s)         | 3.0                                                                                 | 3.0                                                                                 | 3.0                                                                                 | 3.0                                                                                 | 3.0                                                                                 |                                                                                     | 3.0                                                                                 | 3.0                                                                                 |                                                                                     | 3.0                                                                                 | 3.0                                                                                 |                                                                                     |
| All-Red Time (s)        | 1.0                                                                                 | 2.0                                                                                 | 2.0                                                                                 | 1.0                                                                                 | 2.0                                                                                 |                                                                                     | 2.0                                                                                 | 2.0                                                                                 |                                                                                     | 2.0                                                                                 | 2.0                                                                                 |                                                                                     |
| Lost Time Adjust (s)    | 0.0                                                                                 | 0.0                                                                                 | 0.0                                                                                 | 0.0                                                                                 | 0.0                                                                                 |                                                                                     | 0.0                                                                                 | 0.0                                                                                 |                                                                                     | 0.0                                                                                 | 0.0                                                                                 |                                                                                     |
| Total Lost Time (s)     | 4.0                                                                                 | 5.0                                                                                 | 5.0                                                                                 | 4.0                                                                                 | 5.0                                                                                 |                                                                                     | 5.0                                                                                 | 5.0                                                                                 |                                                                                     | 5.0                                                                                 | 5.0                                                                                 |                                                                                     |
| Lead/Lag                | Lead                                                                                |                                                                                     | Lead                                                                                |                                                                                     | Lead                                                                                |                                                                                     | Lag                                                                                 | Lag                                                                                 |                                                                                     | Lag                                                                                 | Lag                                                                                 |                                                                                     |
| Lead-Lag Optimize?      |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Recall Mode             | None                                                                                | None                                                                                | None                                                                                | None                                                                                | None                                                                                |                                                                                     | None                                                                                | None                                                                                |                                                                                     | None                                                                                | None                                                                                |                                                                                     |
| Act Effct Green (s)     | 40.1                                                                                | 30.0                                                                                | 30.0                                                                                | 40.1                                                                                | 30.0                                                                                |                                                                                     | 38.9                                                                                | 38.9                                                                                |                                                                                     | 38.9                                                                                | 38.9                                                                                |                                                                                     |
| Actuated g/C Ratio      | 0.44                                                                                | 0.33                                                                                | 0.33                                                                                | 0.44                                                                                | 0.33                                                                                |                                                                                     | 0.42                                                                                | 0.42                                                                                |                                                                                     | 0.42                                                                                | 0.42                                                                                |                                                                                     |
| v/c Ratio               | 0.19                                                                                | 0.93                                                                                | 0.24                                                                                | 0.70                                                                                | 1.14                                                                                |                                                                                     | 0.97                                                                                | 0.51                                                                                |                                                                                     | 0.47                                                                                | 0.09                                                                                |                                                                                     |
| Control Delay           | 15.1                                                                                | 54.8                                                                                | 12.0                                                                                | 32.1                                                                                | 113.2                                                                               |                                                                                     | 58.5                                                                                | 7.0                                                                                 |                                                                                     | 26.5                                                                                | 5.0                                                                                 |                                                                                     |
| Queue Delay             | 0.0                                                                                 | 0.0                                                                                 | 0.0                                                                                 | 0.0                                                                                 | 0.0                                                                                 |                                                                                     | 0.0                                                                                 | 0.0                                                                                 |                                                                                     | 0.0                                                                                 | 0.0                                                                                 |                                                                                     |
| Total Delay             | 15.1                                                                                | 54.8                                                                                | 12.0                                                                                | 32.1                                                                                | 113.2                                                                               |                                                                                     | 58.5                                                                                | 7.0                                                                                 |                                                                                     | 26.5                                                                                | 5.0                                                                                 |                                                                                     |
| LOS                     | B                                                                                   | D                                                                                   | B                                                                                   | C                                                                                   | F                                                                                   |                                                                                     | E                                                                                   | A                                                                                   |                                                                                     | C                                                                                   | A                                                                                   |                                                                                     |
| Approach Delay          |                                                                                     | 44.5                                                                                |                                                                                     |                                                                                     | 96.3                                                                                |                                                                                     |                                                                                     | 35.2                                                                                |                                                                                     |                                                                                     | 19.0                                                                                |                                                                                     |
| Approach LOS            |                                                                                     | D                                                                                   |                                                                                     |                                                                                     | F                                                                                   |                                                                                     |                                                                                     | D                                                                                   |                                                                                     |                                                                                     | B                                                                                   |                                                                                     |
| Queue Length 50th (ft)  |                                                                                     | 15                                                                                  | 330                                                                                 | 23                                                                                  | 61                                                                                  | -501                                                                                |                                                                                     | 313                                                                                 | 39                                                                                  |                                                                                     | 52                                                                                  | 1                                                                                   |
| Queue Length 95th (ft)  |                                                                                     | 34                                                                                  | #541                                                                                | 67                                                                                  | #138                                                                                | #722                                                                                |                                                                                     | #534                                                                                | 115                                                                                 |                                                                                     | 109                                                                                 | 24                                                                                  |
| Internal Link Dist (ft) |                                                                                     |                                                                                     | 717                                                                                 |                                                                                     | 883                                                                                 |                                                                                     |                                                                                     | 518                                                                                 |                                                                                     |                                                                                     | 548                                                                                 |                                                                                     |
| Turn Bay Length (ft)    |                                                                                     | 125                                                                                 |                                                                                     | 125                                                                                 | 150                                                                                 |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     | 75                                                                                  |                                                                                     |
| Base Capacity (vph)     |                                                                                     | 278                                                                                 | 614                                                                                 | 564                                                                                 | 281                                                                                 | 614                                                                                 |                                                                                     | 589                                                                                 | 905                                                                                 |                                                                                     | 274                                                                                 | 742                                                                                 |
| Starvation Cap Reductn  |                                                                                     | 0                                                                                   | 0                                                                                   | 0                                                                                   | 0                                                                                   | 0                                                                                   |                                                                                     | 0                                                                                   | 0                                                                                   |                                                                                     | 0                                                                                   | 0                                                                                   |
| Spillback Cap Reductn   |                                                                                     | 0                                                                                   | 0                                                                                   | 0                                                                                   | 0                                                                                   | 0                                                                                   |                                                                                     | 0                                                                                   | 0                                                                                   |                                                                                     | 0                                                                                   | 0                                                                                   |
| Storage Cap Reductn     |                                                                                     | 0                                                                                   | 0                                                                                   | 0                                                                                   | 0                                                                                   | 0                                                                                   |                                                                                     | 0                                                                                   | 0                                                                                   |                                                                                     | 0                                                                                   | 0                                                                                   |
| Reduced v/c Ratio       |                                                                                     | 0.18                                                                                | 0.93                                                                                | 0.24                                                                                | 0.66                                                                                | 1.14                                                                                |                                                                                     | 0.94                                                                                | 0.50                                                                                |                                                                                     | 0.46                                                                                | 0.09                                                                                |

Intersection Summary

Area Type: Other  
Cycle Length: 94  
Actuated Cycle Length: 92  
Natural Cycle: 90  
Control Type: Actuated-Uncoordinated  
Maximum v/c Ratio: 1.14  
Intersection Signal Delay: 55.6  
Intersection Capacity Utilization 88.5%  
Analysis Period (min) 15

- Volume exceeds capacity, queue is theoretically infinite.

- Queue shown is maximum after two cycles.

# 95th percentile volume exceeds capacity, queue may be longer.

- Queue shown is maximum after two cycles.

Lanes, Volumes, Timings  
VHB/MSD  
\\hbl\proj\Wat-LD\12239.00\tech\Traffic\Synchro\TIA\_2018\2025 NB\_PM.syn  
07/03/2018

12239.00 :: Needham Street  
19: Wells Avenue/JCC Driveway & Nahanton Street

2025 No Build Conditions  
Timing Plan: Weekday Evening



12239.00 :: Needham Street  
20: Highland Avenue & Riverside Street

2025 No Build Conditions  
Timing Plan: Weekday Evening

| Intersection             |        |        |       |        |      |      |
|--------------------------|--------|--------|-------|--------|------|------|
| Int Delay, s/veh         | 0.3    |        |       |        |      |      |
| Movement                 | NWL    | NWR    | NET   | NER    | SWL  | SWT  |
| Lane Configurations      | ↔      |        | ↕↕    |        |      | ↕    |
| Traffic Vol, veh/h       | 5      | 5      | 880   | 5      | 1    | 1110 |
| Future Vol, veh/h        | 5      | 5      | 880   | 5      | 1    | 1110 |
| Conflicting Peds, #/hr   | 0      | 0      | 0     | 3      | 3    | 0    |
| Sign Control             | Stop   | Stop   | Free  | Free   | Free | Free |
| RT Channelized           | -      | None   | -     | None   | -    | None |
| Storage Length           | 0      | -      | -     | -      | -    | -    |
| Veh in Median Storage, # | 0      | -      | 0     | -      | -    | 0    |
| Grade, %                 | 0      | -      | 0     | -      | -    | 0    |
| Peak Hour Factor         | 92     | 92     | 92    | 92     | 92   | 92   |
| Heavy Vehicles, %        | 0      | 0      | 0     | 0      | 0    | 0    |
| Mvmt Flow                | 5      | 5      | 957   | 5      | 1    | 1207 |
| Major/Minor              |        |        |       |        |      |      |
|                          | Minor1 | Major1 |       | Major2 |      |      |
| Conflicting Flow All     | 2171   | 484    | 0     | 0      | 965  | 0    |
| Stage 1                  | 962    | -      | -     | -      | -    | -    |
| Stage 2                  | 1209   | -      | -     | -      | -    | -    |
| Critical Hdwy            | 6.6    | 6.9    | -     | -      | 4.1  | -    |
| Critical Hdwy Stg 1      | 5.8    | -      | -     | -      | -    | -    |
| Critical Hdwy Stg 2      | 5.4    | -      | -     | -      | -    | -    |
| Follow-up Hdwy           | 3.5    | 3.3    | -     | -      | 2.2  | -    |
| Pot Cap-1 Maneuver       | 46     | 534    | -     | -      | 722  | -    |
| Stage 1                  | 336    | -      | -     | -      | -    | -    |
| Stage 2                  | 285    | -      | -     | -      | -    | -    |
| Platoon blocked, %       |        | -      | -     | -      | -    | -    |
| Mov Cap-1 Maneuver       | 46     | 533    | -     | -      | 722  | -    |
| Mov Cap-2 Maneuver       | 46     | -      | -     | -      | -    | -    |
| Stage 1                  | 335    | -      | -     | -      | -    | -    |
| Stage 2                  | 284    | -      | -     | -      | -    | -    |
| Approach                 |        |        |       |        |      |      |
|                          | NW     | NE     |       | SW     |      |      |
| HCM Control Delay, s     | 53.5   | 0      |       | 0      |      |      |
| HCM LOS                  | F      |        |       |        |      |      |
| Minor Lane/Major Mvmt    |        |        |       |        |      |      |
|                          | NET    | NER    | NWLn1 | SWL    | SWT  |      |
| Capacity (veh/h)         | -      | -      | -     | 85     | 722  |      |
| HCM Lane V/C Ratio       | -      | -      | 0.128 | 0.002  | -    |      |
| HCM Control Delay (s)    | -      | -      | 53.5  | 10     | 0    |      |
| HCM Lane LOS             | -      | -      | F     | A      | A    |      |
| HCM 95th %ile Q(veh)     | -      | -      | 0.4   | 0      | -    |      |

12239.00 :: Needham Street  
21: Highland Avenue & Highland Terrace/Highland Circle

2025 No Build Conditions  
Timing Plan: Weekday Evening

| Intersection             |        |        |      |       |        |       |      |        |      |      |      |      |
|--------------------------|--------|--------|------|-------|--------|-------|------|--------|------|------|------|------|
| Int Delay, s/veh         | 0.7    |        |      |       |        |       |      |        |      |      |      |      |
| Movement                 | SEL    | SET    | SER  | NWL   | NWT    | NWR   | NEL  | NET    | NER  | SWL  | SWT  | SWR  |
| Lane Configurations      |        |        |      |       |        |       |      |        |      |      |      |      |
| Traffic Vol, veh/h       | 5      | 0      | 15   | 5     | 0      | 2     | 10   | 880    | 2    | 5    | 1105 | 5    |
| Future Vol, veh/h        | 5      | 0      | 15   | 5     | 0      | 2     | 10   | 880    | 2    | 5    | 1105 | 5    |
| Conflicting Peds, #/hr   | 0      | 0      | 0    | 0     | 0      | 0     | 6    | 0      | 4    | 4    | 0    | 6    |
| Sign Control             | Stop   | Stop   | Stop | Stop  | Stop   | Stop  | Free | Free   | Free | Free | Free | Free |
| RT Channelized           | -      | -      | None | -     | -      | None  | -    | -      | None | -    | -    | None |
| Storage Length           | -      | -      | -    | -     | -      | -     | -    | -      | -    | -    | -    | -    |
| Veh in Median Storage, # | -      | 0      | -    | -     | 0      | -     | -    | 0      | -    | -    | 0    | -    |
| Grade, %                 | -      | 0      | -    | -     | 0      | -     | -    | 0      | -    | -    | 0    | -    |
| Peak Hour Factor         | 92     | 92     | 92   | 92    | 92     | 92    | 92   | 92     | 92   | 92   | 92   | 92   |
| Heavy Vehicles, %        | 0      | 0      | 0    | 0     | 0      | 0     | 0    | 0      | 0    | 0    | 0    | 0    |
| Mvmt Flow                | 5      | 0      | 16   | 5     | 0      | 2     | 11   | 957    | 2    | 5    | 1201 | 5    |
| Major/Minor              | Minor2 | Minor1 |      |       | Major1 |       |      | Major2 |      |      |      |      |
| Conflicting Flow All     | 1721   | 2205   | 609  | 1594  | 2206   | 483   | 1213 | 0      | 0    | 963  | 0    | 0    |
| Stage 1                  | 1221   | 1221   | -    | 983   | 983    | -     | -    | -      | -    | -    | -    | -    |
| Stage 2                  | 500    | 984    | -    | 611   | 1223   | -     | -    | -      | -    | -    | -    | -    |
| Critical Hdwy            | 7.5    | 6.5    | 6.9  | 7.5   | 6.5    | 6.9   | 4.1  | -      | -    | 4.1  | -    | -    |
| Critical Hdwy Stp 1      | 6.5    | 5.5    | -    | 6.5   | 5.5    | -     | -    | -      | -    | -    | -    | -    |
| Critical Hdwy Stp 2      | 6.5    | 5.5    | -    | 6.5   | 5.5    | -     | -    | -      | -    | -    | -    | -    |
| Follow-up Hdwy           | 3.5    | 4      | 3.3  | 3.5   | 4      | 3.3   | 2.2  | -      | -    | 2.2  | -    | -    |
| Pot Cap-1 Maneuver       | 59     | 45     | 443  | 73    | 45     | 535   | 582  | -      | -    | 723  | -    | -    |
| Stage 1                  | 194    | 255    | -    | 271   | 329    | -     | -    | -      | -    | -    | -    | -    |
| Stage 2                  | 527    | 329    | -    | 453   | 254    | -     | -    | -      | -    | -    | -    | -    |
| Platoon blocked, %       |        |        |      |       |        |       |      |        |      |      |      |      |
| Mov Cap-1 Maneuver       | 56     | 42     | 441  | 67    | 42     | 533   | 582  | -      | -    | 723  | -    | -    |
| Mov Cap-2 Maneuver       | 56     | 42     | -    | 67    | 42     | -     | -    | -      | -    | -    | -    | -    |
| Stage 1                  | 185    | 248    | -    | 259   | 315    | -     | -    | -      | -    | -    | -    | -    |
| Stage 2                  | 504    | 315    | -    | 427   | 247    | -     | -    | -      | -    | -    | -    | -    |
| Approach                 | SE     | NW     |      |       | NE     |       |      | SW     |      |      |      |      |
| HCM Control Delay, s     | 30.6   | 49.2   |      |       | 0.3    |       |      | 0.1    |      |      |      |      |
| HCM LOS                  | D      | E      |      |       |        |       |      |        |      |      |      |      |
| Minor Lane/Major Mvmt    | NEL    | NET    | NER  | NWLn1 | SELn1  | SWL   | SWT  | SWR    |      |      |      |      |
| Capacity (veh/h)         | 582    | -      | -    | 89    | 162    | 723   | -    |        |      |      |      |      |
| HCM Lane V/C Ratio       | 0.019  | -      | -    | 0.085 | 0.134  | 0.008 | -    |        |      |      |      |      |
| HCM Control Delay (s)    | 11.3   | 0.2    | -    | 49.2  | 30.6   | 10    | 0.1  |        |      |      |      |      |
| HCM Lane LOS             | B      | A      | -    | E     | D      | B     | A    |        |      |      |      |      |
| HCM 95th %ile Q(veh)     | 0.1    | -      | -    | 0.3   | 0.5    | 0     | -    |        |      |      |      |      |

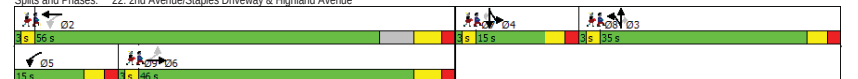
12239.00 :: Needham Street  
22: 2nd Avenue/Staples Driveway & Highland Avenue

2025 No Build Conditions  
Timing Plan: Weekday Evening

| Lane Group              | EBL   | EBT   | EBR  | WBL   | WBT   | WBR  | NBL   | NBT   | NBR   | SBL   | SBT   | SBR   | Ø1   | Ø7   | Ø8   | Ø9   |
|-------------------------|-------|-------|------|-------|-------|------|-------|-------|-------|-------|-------|-------|------|------|------|------|
| Lane Configurations     | ↰     | ↰     | ↰    | ↰     | ↰     | ↰    | ↰     | ↰     | ↰     | ↰     | ↰     | ↰     |      |      |      |      |
| Traffic Volume (vph)    | 10    | 635   | 125  | 175   | 900   | 45   | 345   | 20    | 190   | 60    | 20    | 25    |      |      |      |      |
| Future Volume (vph)     | 10    | 635   | 125  | 175   | 900   | 45   | 345   | 20    | 190   | 60    | 20    | 25    |      |      |      |      |
| Ideal Flow (vphpl)      | 1900  | 1900  | 1900 | 1900  | 1900  | 1900 | 1900  | 1900  | 1900  | 1900  | 1900  | 1900  |      |      |      |      |
| Storage Length (ft)     | 100   | 0     | 100  | 0     | 150   | 0    | 150   | 0     | 100   | 0     | 100   | 50    |      |      |      |      |
| Storage Lanes           | 1     | 0     | 0    | 0     | 1     | 0    | 1     | 0     | 1     | 0     | 1     | 0     |      |      |      |      |
| Taper Length (ft)       | 25    |       |      | 25    |       |      | 25    |       |       | 25    |       |       |      |      |      |      |
| Satd. Flow (prot)       | 1805  | 3505  | 0    | 0     | 3556  | 0    | 1715  | 1727  | 1615  | 0     | 1832  | 1615  |      |      |      |      |
| Flt Permitted           | 0.157 |       |      | 0     | 0.635 | 0    | 0.950 | 0.957 |       |       | 0.964 |       |      |      |      |      |
| Satd. Flow (perm)       | 298   | 3505  | 0    | 0     | 2276  | 0    | 1707  | 1720  | 1592  | 0     | 1830  | 1587  |      |      |      |      |
| Right Turn on Red       |       | Yes   |      |       | Yes   |      |       | Yes   |       |       | Yes   |       |      |      |      |      |
| Satd. Flow (RTOR)       | 20    |       |      | 5     |       |      |       | 207   |       |       | 191   |       |      |      |      |      |
| Link Speed (mph)        | 30    |       |      | 30    |       |      | 30    |       |       | 30    |       |       |      |      |      |      |
| Link Distance (ft)      | 210   |       |      | 361   |       |      | 859   |       |       | 290   |       |       |      |      |      |      |
| Travel Time (s)         | 4.8   |       |      | 8.2   |       |      | 19.5  |       |       | 6.6   |       |       |      |      |      |      |
| Confl. Peds. (#/hr)     | 2     |       | 2    | 2     |       | 2    | 3     |       | 1     | 1     |       | 3     |      |      |      |      |
| Peak Hour Factor        | 0.92  | 0.92  | 0.92 | 0.92  | 0.92  | 0.92 | 0.92  | 0.92  | 0.92  | 0.92  | 0.92  | 0.92  |      |      |      |      |
| Heavy Vehicles (%)      | 0%    | 0%    | 0%   | 0%    | 0%    | 0%   | 0%    | 0%    | 0%    | 0%    | 0%    | 0%    |      |      |      |      |
| Shared Lane Traffic (%) |       |       |      |       |       |      | 47%   |       |       |       |       |       |      |      |      |      |
| Lane Group Flow (vph)   | 11    | 826   | 0    | 0     | 1217  | 0    | 199   | 198   | 207   | 0     | 87    | 27    |      |      |      |      |
| Turn Type               | Perm  | NA    |      | pm+pt | NA    |      | Split | NA    | Perm  | Split | NA    | Perm  |      |      |      |      |
| Protected Phases        | 6     | 6     |      | 5     | 2     |      | 3     | 3     |       | 4     | 4     |       | 1    | 7    | 8    | 9    |
| Permitted Phases        | 6     |       |      | 2     |       |      |       |       | 3     |       |       | 4     |      |      |      |      |
| Detector Phase          | 6     | 6     |      | 5     | 2     |      | 3     | 3     | 3     | 4     | 4     | 4     |      |      |      |      |
| Switch Phase            |       |       |      |       |       |      |       |       |       |       |       |       |      |      |      |      |
| Minimum Initial (s)     | 15.0  | 15.0  |      | 4.0   | 15.0  |      | 10.0  | 10.0  | 10.0  | 4.0   | 4.0   | 4.0   | 1.0  | 1.0  | 1.0  | 1.0  |
| Minimum Split (s)       | 31.0  | 31.0  |      | 9.0   | 23.0  |      | 23.0  | 23.0  | 23.0  | 26.0  | 26.0  | 26.0  | 3.0  | 3.0  | 3.0  | 3.0  |
| Total Split (s)         | 46.0  | 46.0  |      | 15.0  | 56.0  |      | 35.0  | 35.0  | 35.0  | 15.0  | 15.0  | 15.0  | 3.0  | 3.0  | 3.0  | 3.0  |
| Total Split (%)         | 38.3% | 38.3% |      | 12.5% | 46.7% |      | 29.2% | 29.2% | 29.2% | 12.5% | 12.5% | 12.5% | 3%   | 3%   | 3%   | 3%   |
| Yellow Time (s)         | 4.0   | 4.0   |      | 3.0   | 4.0   |      | 3.0   | 3.0   | 3.0   | 3.0   | 3.0   | 3.0   | 2.0  | 2.0  | 2.0  | 2.0  |
| All-Red Time (s)        | 2.0   | 2.0   |      | 2.0   | 2.0   |      | 2.0   | 2.0   | 2.0   | 2.0   | 2.0   | 2.0   | 0.0  | 0.0  | 0.0  | 0.0  |
| Lost Time Adjust (s)    | 0.0   | 0.0   |      | 0.0   | 0.0   |      | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   |      |      |      |      |
| Total Lost Time (s)     | 6.0   | 6.0   |      | 6.0   | 6.0   |      | 5.0   | 5.0   | 5.0   | 5.0   | 5.0   | 5.0   |      |      |      |      |
| Lead/Lag                |       |       |      | Lead  | Lag   |      | Lag   | Lag   | Lag   | Lag   | Lag   | Lag   | Lead | Lead | Lead | Lag  |
| Lead-Lag Optimize?      |       |       |      |       |       |      |       |       |       |       |       |       |      |      |      |      |
| Recall Mode             | None  | None  |      | None  | None  |      | None  | None  | None  | None  | None  | None  | None | None | None | None |
| Act Effct Green (s)     | 51.6  | 51.6  |      |       | 51.6  |      | 16.2  | 16.2  | 16.2  |       | 9.9   | 9.9   |      |      |      |      |
| Actuated g/C Ratio      | 0.56  | 0.56  |      |       | 0.56  |      | 0.17  | 0.17  | 0.17  |       | 0.11  | 0.11  |      |      |      |      |
| v/c Ratio               | 0.07  | 0.42  |      |       | 0.96  |      | 0.67  | 0.66  | 0.46  |       | 0.45  | 0.08  |      |      |      |      |
| Control Delay           | 18.4  | 15.7  |      |       | 41.3  |      | 48.8  | 48.4  | 8.9   |       | 48.9  | 0.4   |      |      |      |      |
| Queue Delay             | 0.0   | 0.0   |      |       | 0.0   |      | 0.0   | 0.0   | 0.0   |       | 0.0   | 0.0   |      |      |      |      |
| Total Delay             | 18.4  | 15.7  |      |       | 41.3  |      | 48.8  | 48.4  | 8.9   |       | 48.9  | 0.4   |      |      |      |      |
| LOS                     | B     | B     |      |       | D     |      | D     | D     | A     |       | D     | A     |      |      |      |      |
| Approach Delay          | 15.8  |       |      |       | 41.3  |      |       | 35.0  |       |       | 37.4  |       |      |      |      |      |
| Approach LOS            | B     |       |      |       | D     |      |       | C     |       |       | D     |       |      |      |      |      |
| Queue Length 50th (ft)  | 3     | 132   |      |       | 328   |      | 112   | 112   | 0     |       | 48    | 0     |      |      |      |      |
| Queue Length 95th (ft)  | 19    | 323   |      |       | #798  |      | 231   | 230   | 63    |       | 112   | 0     |      |      |      |      |
| Internal Link Dist (ft) |       | 130   |      |       | 281   |      |       | 779   |       |       | 210   |       |      |      |      |      |
| Turn Bay Length (ft)    | 100   |       |      |       |       |      | 150   |       | 100   |       |       | 50    |      |      |      |      |
| Base Capacity (vph)     | 165   | 1956  |      |       | 1393  |      | 571   | 575   | 669   |       | 236   | 371   |      |      |      |      |
| Starvation Cap Reductn  | 0     | 0     |      |       | 0     |      | 0     | 0     | 0     |       | 0     | 0     |      |      |      |      |
| Spillback Cap Reductn   | 0     | 0     |      |       | 0     |      | 0     | 0     | 0     |       | 0     | 0     |      |      |      |      |
| Storage Cap Reductn     | 0     | 0     |      |       | 0     |      | 0     | 0     | 0     |       | 0     | 0     |      |      |      |      |
| Reduced v/c Ratio       | 0.07  | 0.42  |      |       | 0.87  |      | 0.35  | 0.34  | 0.31  |       | 0.37  | 0.07  |      |      |      |      |

| Intersection Summary                                            |                        |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|-----------------------------------------------------------------|------------------------|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|
| Area Type:                                                      | Other                  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Cycle Length: 120                                               |                        |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Actuated Cycle Length: 92.9                                     |                        |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Natural Cycle: 140                                              |                        |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Control Type: Actuated-Uncoordinated                            |                        |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Maximum v/c Ratio: 0.96                                         |                        |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Intersection Signal Delay: 32.1                                 | Intersection LOS: C    |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Intersection Capacity Utilization 63.9%                         | ICU Level of Service E |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Analysis Period (min) 15                                        |                        |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| # 95th percentile volume exceeds capacity, queue may be longer. |                        |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Queue shown is maximum after two cycles.                        |                        |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |

Splits and Phases: 22: 2nd Avenue/Staples Driveway & Highland Avenue



12239.00 :: Needham Street  
23: Highland Avenue & Charles Street

2025 No Build Conditions  
Timing Plan: Weekday Evening

| Intersection             |                                                                                   |                                                                                   |                                                                                   |       |                                                                                   |      |
|--------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-------|-----------------------------------------------------------------------------------|------|
| Int Delay, s/veh         | 4.1                                                                               |                                                                                   |                                                                                   |       |                                                                                   |      |
| Movement                 | EBL                                                                               | EBT                                                                               | WBT                                                                               | WBR   | SBL                                                                               | SBR  |
| Lane Configurations      |  |  |  |       |  |      |
| Traffic Vol, veh/h       | 65                                                                                | 750                                                                               | 1255                                                                              | 15    | 20                                                                                | 110  |
| Future Vol, veh/h        | 65                                                                                | 750                                                                               | 1255                                                                              | 15    | 20                                                                                | 110  |
| Conflicting Peds, #/hr   | 4                                                                                 | 0                                                                                 | 0                                                                                 | 4     | 0                                                                                 | 0    |
| Sign Control             | Free                                                                              | Free                                                                              | Free                                                                              | Free  | Stop                                                                              | Stop |
| RT Channelized           | -                                                                                 | None                                                                              | -                                                                                 | None  | -                                                                                 | None |
| Storage Length           | 100                                                                               | -                                                                                 | -                                                                                 | -     | 0                                                                                 | -    |
| Veh in Median Storage, # | -                                                                                 | 0                                                                                 | 0                                                                                 | -     | 0                                                                                 | -    |
| Grade, %                 | -                                                                                 | 0                                                                                 | 0                                                                                 | -     | 0                                                                                 | -    |
| Peak Hour Factor         | 92                                                                                | 92                                                                                | 92                                                                                | 92    | 92                                                                                | 92   |
| Heavy Vehicles, %        | 1                                                                                 | 1                                                                                 | 0                                                                                 | 0     | 0                                                                                 | 0    |
| Mvmt Flow                | 71                                                                                | 815                                                                               | 1364                                                                              | 16    | 22                                                                                | 120  |
| Major/Minor              |                                                                                   |                                                                                   |                                                                                   |       |                                                                                   |      |
| Major1                   | Major2                                                                            |                                                                                   | Minor2                                                                            |       |                                                                                   |      |
| Conflicting Flow All     | 1384                                                                              | 0                                                                                 | -                                                                                 | 0     | 1925                                                                              | 694  |
| Stage 1                  | -                                                                                 | -                                                                                 | -                                                                                 | -     | 1376                                                                              | -    |
| Stage 2                  | -                                                                                 | -                                                                                 | -                                                                                 | -     | 549                                                                               | -    |
| Critical Hdwy            | 4.12                                                                              | -                                                                                 | -                                                                                 | -     | 6.8                                                                               | 6.9  |
| Critical Hdwy Stg 1      | -                                                                                 | -                                                                                 | -                                                                                 | -     | 5.8                                                                               | -    |
| Critical Hdwy Stg 2      | -                                                                                 | -                                                                                 | -                                                                                 | -     | 5.8                                                                               | -    |
| Follow-up Hdwy           | 2.21                                                                              | -                                                                                 | -                                                                                 | -     | 3.5                                                                               | 3.3  |
| Pot Cap-1 Maneuver       | 496                                                                               | -                                                                                 | -                                                                                 | -     | 60                                                                                | 390  |
| Stage 1                  | -                                                                                 | -                                                                                 | -                                                                                 | -     | 203                                                                               | -    |
| Stage 2                  | -                                                                                 | -                                                                                 | -                                                                                 | -     | 548                                                                               | -    |
| Platoon blocked, %       | -                                                                                 | -                                                                                 | -                                                                                 | -     | -                                                                                 | -    |
| Mov Cap-1 Maneuver       | 496                                                                               | -                                                                                 | -                                                                                 | -     | 51                                                                                | 389  |
| Mov Cap-2 Maneuver       | -                                                                                 | -                                                                                 | -                                                                                 | -     | 51                                                                                | -    |
| Stage 1                  | -                                                                                 | -                                                                                 | -                                                                                 | -     | 202                                                                               | -    |
| Stage 2                  | -                                                                                 | -                                                                                 | -                                                                                 | -     | 468                                                                               | -    |
| Approach                 |                                                                                   |                                                                                   |                                                                                   |       |                                                                                   |      |
| EB                       | WB                                                                                |                                                                                   | SB                                                                                |       |                                                                                   |      |
| HCM Control Delay, s     | 1.1                                                                               | 0                                                                                 | -                                                                                 | -     | 62.3                                                                              | -    |
| HCM LOS                  | -                                                                                 | -                                                                                 | -                                                                                 | -     | F                                                                                 | -    |
| Minor Lane/Major Mvmt    |                                                                                   |                                                                                   |                                                                                   |       |                                                                                   |      |
| EBL                      | EBT                                                                               | WBT                                                                               | WBR                                                                               | SBLn1 |                                                                                   |      |
| Capacity (veh/h)         | 496                                                                               | -                                                                                 | -                                                                                 | -     | 193                                                                               | -    |
| HCM Lane V/C Ratio       | 0.142                                                                             | -                                                                                 | -                                                                                 | -     | 0.732                                                                             | -    |
| HCM Control Delay (s)    | 13.5                                                                              | -                                                                                 | -                                                                                 | -     | 62.3                                                                              | -    |
| HCM Lane LOS             | B                                                                                 | -                                                                                 | -                                                                                 | -     | F                                                                                 | -    |
| HCM 95th %ile Q(veh)     | 0.5                                                                               | -                                                                                 | -                                                                                 | -     | 4.7                                                                               | -    |

12239.00 :: Needham Street  
24: Highland Avenue & Wexford Street

2025 No Build Conditions  
Timing Plan: Weekday Evening

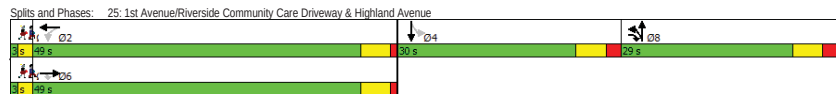
| Intersection             |                                                                                     |                                                                                     |                                                                                     |       |                                                                                     |      |
|--------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------|-------------------------------------------------------------------------------------|------|
| Int Delay, s/veh         | 21.9                                                                                |                                                                                     |                                                                                     |       |                                                                                     |      |
| Movement                 | EBL                                                                                 | EBT                                                                                 | WBT                                                                                 | WBR   | SBL                                                                                 | SBR  |
| Lane Configurations      |  |  |  |       |  |      |
| Traffic Vol, veh/h       | 110                                                                                 | 790                                                                                 | 1255                                                                                | 25    | 25                                                                                  | 205  |
| Future Vol, veh/h        | 110                                                                                 | 790                                                                                 | 1255                                                                                | 25    | 25                                                                                  | 205  |
| Conflicting Peds, #/hr   | 5                                                                                   | 0                                                                                   | 0                                                                                   | 5     | 0                                                                                   | 0    |
| Sign Control             | Free                                                                                | Free                                                                                | Free                                                                                | Free  | Stop                                                                                | Stop |
| RT Channelized           | -                                                                                   | None                                                                                | -                                                                                   | None  | -                                                                                   | None |
| Storage Length           | 100                                                                                 | -                                                                                   | -                                                                                   | -     | 0                                                                                   | -    |
| Veh in Median Storage, # | -                                                                                   | 0                                                                                   | 0                                                                                   | -     | 0                                                                                   | -    |
| Grade, %                 | -                                                                                   | 0                                                                                   | 0                                                                                   | -     | 0                                                                                   | -    |
| Peak Hour Factor         | 92                                                                                  | 92                                                                                  | 92                                                                                  | 92    | 92                                                                                  | 92   |
| Heavy Vehicles, %        | 0                                                                                   | 0                                                                                   | 0                                                                                   | 0     | 0                                                                                   | 0    |
| Mvmt Flow                | 120                                                                                 | 859                                                                                 | 1364                                                                                | 27    | 27                                                                                  | 223  |
| Major/Minor              |                                                                                     |                                                                                     |                                                                                     |       |                                                                                     |      |
| Major1                   | Major2                                                                              |                                                                                     | Minor2                                                                              |       |                                                                                     |      |
| Conflicting Flow All     | 1396                                                                                | 0                                                                                   | -                                                                                   | 0     | 2051                                                                                | 701  |
| Stage 1                  | -                                                                                   | -                                                                                   | -                                                                                   | -     | 1383                                                                                | -    |
| Stage 2                  | -                                                                                   | -                                                                                   | -                                                                                   | -     | 668                                                                                 | -    |
| Critical Hdwy            | 4.1                                                                                 | -                                                                                   | -                                                                                   | -     | 6.8                                                                                 | 6.9  |
| Critical Hdwy Stg 1      | -                                                                                   | -                                                                                   | -                                                                                   | -     | 5.8                                                                                 | -    |
| Critical Hdwy Stg 2      | -                                                                                   | -                                                                                   | -                                                                                   | -     | 5.8                                                                                 | -    |
| Follow-up Hdwy           | 2.2                                                                                 | -                                                                                   | -                                                                                   | -     | 3.5                                                                                 | 3.3  |
| Pot Cap-1 Maneuver       | 496                                                                                 | -                                                                                   | -                                                                                   | -     | 49                                                                                  | 386  |
| Stage 1                  | -                                                                                   | -                                                                                   | -                                                                                   | -     | 202                                                                                 | -    |
| Stage 2                  | -                                                                                   | -                                                                                   | -                                                                                   | -     | 477                                                                                 | -    |
| Platoon blocked, %       | -                                                                                   | -                                                                                   | -                                                                                   | -     | -                                                                                   | -    |
| Mov Cap-1 Maneuver       | 496                                                                                 | -                                                                                   | -                                                                                   | -     | 37                                                                                  | 384  |
| Mov Cap-2 Maneuver       | -                                                                                   | -                                                                                   | -                                                                                   | -     | 37                                                                                  | -    |
| Stage 1                  | -                                                                                   | -                                                                                   | -                                                                                   | -     | 201                                                                                 | -    |
| Stage 2                  | -                                                                                   | -                                                                                   | -                                                                                   | -     | 360                                                                                 | -    |
| Approach                 |                                                                                     |                                                                                     |                                                                                     |       |                                                                                     |      |
| EB                       | WB                                                                                  |                                                                                     | SB                                                                                  |       |                                                                                     |      |
| HCM Control Delay, s     | 1.8                                                                                 | 0                                                                                   | -                                                                                   | -     | 222.5                                                                               | -    |
| HCM LOS                  | -                                                                                   | -                                                                                   | -                                                                                   | -     | F                                                                                   | -    |
| Minor Lane/Major Mvmt    |                                                                                     |                                                                                     |                                                                                     |       |                                                                                     |      |
| EBL                      | EBT                                                                                 | WBT                                                                                 | WBR                                                                                 | SBLn1 |                                                                                     |      |
| Capacity (veh/h)         | 496                                                                                 | -                                                                                   | -                                                                                   | -     | 190                                                                                 | -    |
| HCM Lane V/C Ratio       | 0.241                                                                               | -                                                                                   | -                                                                                   | -     | 1.316                                                                               | -    |
| HCM Control Delay (s)    | 14.5                                                                                | -                                                                                   | -                                                                                   | -     | 222.5                                                                               | -    |
| HCM Lane LOS             | B                                                                                   | -                                                                                   | -                                                                                   | -     | F                                                                                   | -    |
| HCM 95th %ile Q(veh)     | 0.9                                                                                 | -                                                                                   | -                                                                                   | -     | 14.1                                                                                | -    |

12239.00 :: Needham Street  
25: 1st Avenue/Riverside Community Care Driveway & Highland Avenue

2025 No Build Conditions  
Timing Plan: Weekday Evening

| Lane Group              | EBL   | EBT   | EBR   | WBL   | WBT   | WBR   | NBL   | NBT   | NBR   | SBL   | SBT  | SBR  | Ø1   | Ø5 |
|-------------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|------|------|------|----|
| Lane Configurations     |       | EBT   | EBR   | WBL   | WBT   | WBR   | NBL   | NBT   | NBR   | SBL   | SBT  | SBR  |      |    |
| Traffic Volume (vph)    | 0     | 860   | 195   | 5     | 1455  | 15    | 485   | 0     | 90    | 0     | 0    | 20   |      |    |
| Future Volume (vph)     | 0     | 860   | 195   | 5     | 1455  | 15    | 485   | 0     | 90    | 0     | 0    | 20   |      |    |
| Ideal Flow (vphpl)      | 1900  | 1900  | 1900  | 1900  | 1900  | 1900  | 1900  | 1900  | 1900  | 1900  | 1900 | 1900 |      |    |
| Storage Length (ft)     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 200   | 0     | 0    | 0    |      |    |
| Storage Lanes           | 0     | 1     | 0     | 0     | 1     | 0     | 1     | 0     | 0     | 0     | 0    | 0    |      |    |
| Taper Length (ft)       | 25    |       | 25    |       | 25    |       | 25    |       | 25    |       | 25   |      |      |    |
| Satd. Flow (prot)       | 0     | 3610  | 1615  | 0     | 3606  | 0     | 1698  | 1637  | 0     | 0     | 1644 | 0    |      |    |
| Flt Permitted           |       |       |       |       | 0.952 |       | 0.950 | 0.967 |       |       |      |      |      |    |
| Satd. Flow (perm)       | 0     | 3610  | 1578  | 0     | 3433  | 0     | 1698  | 1637  | 0     | 0     | 1644 | 0    |      |    |
| Right Turn on Red       |       | Yes   |       |       | Yes   |       |       | Yes   |       |       | Yes  |      |      |    |
| Satd. Flow (RTOR)       |       | 212   |       |       | 1     |       |       | 98    |       |       | 98   |      |      |    |
| Link Speed (mph)        |       | 30    |       |       | 30    |       |       | 30    |       |       | 30   |      |      |    |
| Link Distance (ft)      |       | 377   |       |       | 272   |       |       | 825   |       |       | 147  |      |      |    |
| Travel Time (s)         |       | 8.6   |       |       | 6.2   |       |       | 18.8  |       |       | 3.3  |      |      |    |
| Confl. Peds. (#/hr)     |       |       | 1     | 1     |       |       |       |       | 2     | 2     |      |      |      |    |
| Peak Hour Factor        | 0.92  | 0.92  | 0.92  | 0.92  | 0.92  | 0.92  | 0.92  | 0.92  | 0.92  | 0.92  | 0.92 | 0.92 |      |    |
| Heavy Vehicles (%)      | 0%    | 0%    | 0%    | 0%    | 0%    | 0%    | 1%    | 1%    | 0%    | 0%    | 0%   | 0%   |      |    |
| Shared Lane Traffic (%) |       |       |       |       |       |       | 40%   |       |       |       |      |      |      |    |
| Lane Group Flow (vph)   | 0     | 935   | 212   | 0     | 1603  | 0     | 316   | 309   | 0     | 0     | 22   | 0    |      |    |
| Turn Type               |       | NA    | pm+ov | Perm  | NA    |       | Split | NA    |       |       |      |      |      |    |
| Protected Phases        |       | 6     | 8     |       | 2     |       | 8     | 8     |       |       | 4    |      | 1    | 5  |
| Permitted Phases        |       | 6     |       | 2     |       |       |       |       |       | 4     |      |      |      |    |
| Detector Phase          |       | 6     | 8     | 2     | 2     |       | 8     | 8     |       | 4     | 4    |      |      |    |
| Switch Phase            |       |       |       |       |       |       |       |       |       |       |      |      |      |    |
| Minimum Initial (s)     | 10.0  | 6.0   | 10.0  | 10.0  |       | 6.0   | 6.0   |       | 6.0   | 6.0   |      | 1.0  | 1.0  |    |
| Minimum Split (s)       | 25.0  | 12.0  | 16.0  | 16.0  |       | 12.0  | 12.0  |       | 29.0  | 29.0  |      | 3.0  | 3.0  |    |
| Total Split (s)         | 49.0  | 29.0  | 49.0  | 49.0  |       | 29.0  | 29.0  |       | 30.0  | 30.0  |      | 3.0  | 3.0  |    |
| Total Split (%)         | 44.1% | 26.1% | 44.1% | 44.1% |       | 26.1% | 26.1% |       | 27.0% | 27.0% |      | 3%   | 3%   |    |
| Yellow Time (s)         | 4.0   | 4.0   | 4.0   | 4.0   |       | 4.0   | 4.0   |       | 4.0   | 4.0   |      | 2.0  | 2.0  |    |
| All-Red Time (s)        | 1.0   | 2.0   | 1.0   | 1.0   |       | 2.0   | 2.0   |       | 2.0   | 2.0   |      | 0.0  | 0.0  |    |
| Last Time Adjust (s)    | 0.0   | 0.0   | 0.0   | 0.0   |       | 0.0   | 0.0   |       | 0.0   | 0.0   |      | 0.0  | 0.0  |    |
| Total Lost Time (s)     | 5.0   | 6.0   |       | 5.0   |       | 6.0   | 6.0   |       |       | 6.0   |      |      |      |    |
| Lead/Lag                | Lag   |       | Lag   | Lag   |       |       |       |       |       |       |      | Lead | Lead |    |
| Lead-Lag Optimize?      | Yes   |       | Yes   | Yes   |       |       |       |       |       |       |      | Yes  | Yes  |    |
| Recall Mode             | Min   | None  | Min   | Min   |       | None  | None  |       | None  | None  |      | None | None |    |
| Act Effct Green (s)     | 44.6  | 64.1  |       | 45.1  |       | 20.5  | 20.5  |       |       | 8.8   |      |      |      |    |
| Actuated g/C Ratio      | 0.53  | 0.77  |       | 0.54  |       | 0.25  | 0.25  |       |       | 0.11  |      |      |      |    |
| v/c Ratio               | 0.49  | 0.17  |       | 0.87  |       | 0.76  | 0.65  |       |       | 0.08  |      |      |      |    |
| Control Delay           | 16.3  | 1.1   |       | 26.2  |       | 44.4  | 27.9  |       |       | 0.7   |      |      |      |    |
| Queue Delay             | 0.0   | 0.0   |       | 0.0   |       | 0.0   | 0.0   |       |       | 0.0   |      |      |      |    |
| Total Delay             | 16.3  | 1.1   |       | 26.2  |       | 44.4  | 27.9  |       |       | 0.7   |      |      |      |    |
| LOS                     | B     | A     |       | C     |       | D     | C     |       |       | A     |      |      |      |    |
| Approach Delay          | 13.5  |       |       | 26.2  |       |       | 36.3  |       |       | 0.7   |      |      |      |    |
| Approach LOS            | B     |       |       | C     |       |       | D     |       |       | A     |      |      |      |    |
| Queue Length 50th (ft)  | 127   | 0     |       | 303   |       | 138   | 87    |       |       | 0     |      |      |      |    |
| Queue Length 95th (ft)  | 348   | 22    |       | #819  |       | #383  | #250  |       |       | 0     |      |      |      |    |
| Internal Link Dist (ft) | 297   |       |       | 192   |       |       | 745   |       |       | 67    |      |      |      |    |
| Turn Bay Length (ft)    |       |       |       |       |       |       |       |       |       |       |      |      |      |    |
| Base Capacity (vph)     | 1946  | 1309  |       | 1851  |       | 478   | 531   |       |       | 552   |      |      |      |    |
| Starvation Cap Reductn  | 0     | 0     |       | 0     |       | 0     | 0     |       |       | 0     |      |      |      |    |
| Spillback Cap Reductn   | 0     | 0     |       | 0     |       | 0     | 0     |       |       | 0     |      |      |      |    |
| Storage Cap Reductn     | 0     | 0     |       | 0     |       | 0     | 0     |       |       | 0     |      |      |      |    |
| Reduced v/c Ratio       | 0.48  | 0.16  |       | 0.87  |       | 0.66  | 0.58  |       |       | 0.04  |      |      |      |    |

| Intersection Summary                                            |                        |
|-----------------------------------------------------------------|------------------------|
| Area Type:                                                      | Other                  |
| Cycle Length: 111                                               |                        |
| Actuated Cycle Length: 83.6                                     |                        |
| Natural Cycle: 120                                              |                        |
| Control Type: Actuated-Uncoordinated                            |                        |
| Maximum v/c Ratio: 0.87                                         |                        |
| Intersection Signal Delay: 23.6                                 | Intersection LOS: C    |
| Intersection Capacity Utilization 76.2%                         | ICU Level of Service D |
| Analysis Period (min): 15                                       |                        |
| # 95th percentile volume exceeds capacity, queue may be longer. |                        |
| Queue shown is maximum after two cycles.                        |                        |



12239.00 :: Needham Street  
26: I-95 NB Ramps & Highland Avenue

2025 No Build Conditions  
Timing Plan: Weekday Evening

| Intersection             |        |      |       |        |      |       |        |      |       |        |      |       |  |
|--------------------------|--------|------|-------|--------|------|-------|--------|------|-------|--------|------|-------|--|
| Int Delay, s/veh         | 1.3    |      |       |        |      |       |        |      |       |        |      |       |  |
| Movement                 | EBL    | EBT  | EBR   | WBL    | WBT  | WBR   | NBL    | NBT  | NBR   | SBL    | SBT  | SBR   |  |
| Lane Configurations      |        | ↕↕   | ↗     |        | ↕↕   |       |        |      | ↗     |        |      | ↗     |  |
| Traffic Vol, veh/h       | 0      | 860  | 455   | 0      | 1030 | 930   | 0      | 0    | 195   | 0      | 0    | 110   |  |
| Future Vol, veh/h        | 0      | 860  | 455   | 0      | 1030 | 930   | 0      | 0    | 195   | 0      | 0    | 110   |  |
| Conflicting Peds, #/hr   | 3      | 0    | 0     | 0      | 0    | 3     | 0      | 0    | 0     | 0      | 0    | 3     |  |
| Sign Control             | Free   | Free | Free  | Free   | Free | Free  | Stop   | Stop | Stop  | Stop   | Stop | Stop  |  |
| RT Channelized           | -      | -    | Yield | -      | -    | Yield | -      | -    | Yield | -      | -    | Yield |  |
| Storage Length           | -      | -    | 0     | -      | -    | -     | -      | -    | 0     | -      | -    | 0     |  |
| Veh in Median Storage, # | -      | 0    | -     | -      | 0    | -     | -      | -    | 0     | -      | -    | 0     |  |
| Grade, %                 | -      | 0    | -     | -      | 0    | -     | -      | -    | 0     | -      | -    | 0     |  |
| Peak Hour Factor         | 92     | 92   | 92    | 92     | 92   | 92    | 92     | 92   | 92    | 92     | 92   | 92    |  |
| Heavy Vehicles, %        | 1      | 1    | 1     | 1      | 1    | 1     | 2      | 2    | 2     | 2      | 2    | 2     |  |
| Mvmt Flow                | 0      | 935  | 495   | 0      | 1120 | 1011  | 0      | 0    | 212   | 0      | 0    | 120   |  |
|                          |        |      |       |        |      |       |        |      |       |        |      |       |  |
| Major/Minor              | Major1 |      |       | Major2 |      |       | Minor1 |      |       | Minor2 |      |       |  |
| Conflicting Flow All     | -      | 0    | 0     | -      | -    | 0     | -      | -    | 467   | -      | -    | 566   |  |
| Stage 1                  | -      | -    | -     | -      | -    | -     | -      | -    | -     | -      | -    | -     |  |
| Stage 2                  | -      | -    | -     | -      | -    | -     | -      | -    | -     | -      | -    | -     |  |
| Critical Hdwy            | -      | -    | -     | -      | -    | -     | -      | -    | 6.94  | -      | -    | 6.94  |  |
| Critical Hdwy Stg 1      | -      | -    | -     | -      | -    | -     | -      | -    | -     | -      | -    | -     |  |
| Critical Hdwy Stg 2      | -      | -    | -     | -      | -    | -     | -      | -    | -     | -      | -    | -     |  |
| Follow-up Hdwy           | -      | -    | -     | -      | -    | -     | -      | -    | 3.32  | -      | -    | 3.32  |  |
| Pot Cap-1 Maneuver       | 0      | -    | -     | 0      | -    | -     | 0      | 0    | 542   | 0      | 0    | 467   |  |
| Stage 1                  | 0      | -    | -     | 0      | -    | -     | 0      | 0    | -     | 0      | 0    | -     |  |
| Stage 2                  | 0      | -    | -     | 0      | -    | -     | 0      | 0    | -     | 0      | 0    | -     |  |
| Platoon blocked, %       | -      | -    | -     | -      | -    | -     | -      | -    | 542   | -      | -    | 465   |  |
| Mov Cap-1 Maneuver       | -      | -    | -     | -      | -    | -     | -      | -    | -     | -      | -    | -     |  |
| Mov Cap-2 Maneuver       | -      | -    | -     | -      | -    | -     | -      | -    | -     | -      | -    | -     |  |
| Stage 1                  | -      | -    | -     | -      | -    | -     | -      | -    | -     | -      | -    | -     |  |
| Stage 2                  | -      | -    | -     | -      | -    | -     | -      | -    | -     | -      | -    | -     |  |
|                          |        |      |       |        |      |       |        |      |       |        |      |       |  |
| Approach                 | EB     |      |       | WB     |      |       | NB     |      |       | SB     |      |       |  |
| HCM Control Delay, s     | 0      |      |       | 0      |      |       | 15.8   |      |       | 15.4   |      |       |  |
| HCM LOS                  |        |      |       |        |      |       | C      |      |       | C      |      |       |  |
|                          |        |      |       |        |      |       |        |      |       |        |      |       |  |
| Minor Lane/Major Mvmt    | NBLn1  | EBT  | EBR   | WBT    | WBR  | SBLn1 |        |      |       |        |      |       |  |
| Capacity (veh/h)         | 542    | -    | -     | -      | -    | 465   |        |      |       |        |      |       |  |
| HCM Lane V/C Ratio       | 0.391  | -    | -     | -      | -    | 0.257 |        |      |       |        |      |       |  |
| HCM Control Delay (s)    | 15.8   | -    | -     | -      | -    | 15.4  |        |      |       |        |      |       |  |
| HCM Lane LOS             | C      | -    | -     | -      | -    | C     |        |      |       |        |      |       |  |
| HCM 95th %ile Q(veh)     | 1.8    | -    | -     | -      | -    | 1     |        |      |       |        |      |       |  |

12239.00 :: Needham Street  
27: I-95 SB Ramps & Highland Avenue

2025 No Build Conditions  
Timing Plan: Weekday Evening

| Intersection             |        |        |       |        |      |        |      |      |       |      |      |       |
|--------------------------|--------|--------|-------|--------|------|--------|------|------|-------|------|------|-------|
| Int Delay, s/veh         | 6.9    |        |       |        |      |        |      |      |       |      |      |       |
| Movement                 | EBL    | EBT    | EBR   | WBL    | WBT  | WBR    | NBL  | NBT  | NBR   | SBL  | SBT  | SBR   |
| Lane Configurations      |        | ↕      |       |        | ↕    | ↕      |      |      | ↕     |      |      | ↕     |
| Traffic Vol, veh/h       | 0      | 975    | 260   | 0      | 720  | 420    | 0    | 0    | 340   | 0    | 0    | 415   |
| Future Vol, veh/h        | 0      | 975    | 260   | 0      | 720  | 420    | 0    | 0    | 340   | 0    | 0    | 415   |
| Conflicting Peds, #/hr   | 3      | 0      | 0     | 0      | 0    | 3      | 0    | 0    | 0     | 0    | 0    | 3     |
| Sign Control             | Free   | Free   | Free  | Free   | Free | Free   | Stop | Stop | Stop  | Stop | Stop | Stop  |
| RT Channelized           | -      | -      | Yield | -      | -    | Yield  | -    | -    | Yield | -    | -    | Yield |
| Storage Length           | -      | -      | -     | -      | -    | 0      | -    | -    | 0     | -    | -    | 0     |
| Veh in Median Storage, # | -      | 0      | -     | -      | 0    | -      | -    | 0    | -     | -    | 0    | -     |
| Grade, %                 | -      | 0      | -     | -      | 0    | -      | -    | 0    | -     | -    | 0    | -     |
| Peak Hour Factor         | 92     | 92     | 92    | 92     | 92   | 92     | 92   | 92   | 92    | 92   | 92   | 92    |
| Heavy Vehicles, %        | 1      | 1      | 1     | 1      | 1    | 1      | 2    | 2    | 2     | 0    | 0    | 0     |
| Mvmt Flow                | 0      | 1060   | 283   | 0      | 783  | 457    | 0    | 0    | 370   | 0    | 0    | 451   |
| Major/Minor              | Major1 | Major2 |       | Minor1 |      | Minor2 |      |      |       |      |      |       |
| Conflicting Flow All     | -      | 0      | 0     | -      | 0    | -      | -    | 530  | -     | -    | 397  | -     |
| Stage 1                  | -      | -      | -     | -      | -    | -      | -    | -    | -     | -    | -    | -     |
| Stage 2                  | -      | -      | -     | -      | -    | -      | -    | -    | -     | -    | -    | -     |
| Critical Hdwy            | -      | -      | -     | -      | -    | -      | -    | 6.94 | -     | -    | 6.9  | -     |
| Critical Hdwy Stg 1      | -      | -      | -     | -      | -    | -      | -    | -    | -     | -    | -    | -     |
| Critical Hdwy Stg 2      | -      | -      | -     | -      | -    | -      | -    | -    | -     | -    | -    | -     |
| Follow-up Hdwy           | -      | -      | -     | -      | -    | -      | -    | 3.32 | -     | -    | 3.3  | -     |
| Pot Cap-1 Maneuver       | 0      | -      | -     | 0      | -    | -      | 0    | 0    | 493   | 0    | 0    | 608   |
| Stage 1                  | 0      | -      | -     | 0      | -    | -      | 0    | 0    | -     | 0    | 0    | -     |
| Stage 2                  | 0      | -      | -     | 0      | -    | -      | 0    | 0    | -     | 0    | 0    | -     |
| Platoon blocked, %       | -      | -      | -     | -      | -    | -      | -    | -    | -     | -    | -    | -     |
| Mov Cap-1 Maneuver       | -      | -      | -     | -      | -    | -      | -    | 493  | -     | -    | 605  | -     |
| Mov Cap-2 Maneuver       | -      | -      | -     | -      | -    | -      | -    | -    | -     | -    | -    | -     |
| Stage 1                  | -      | -      | -     | -      | -    | -      | -    | -    | -     | -    | -    | -     |
| Stage 2                  | -      | -      | -     | -      | -    | -      | -    | -    | -     | -    | -    | -     |
| Approach                 | EB     | WB     |       | NB     |      | SB     |      |      |       |      |      |       |
| HCM Control Delay, s     | 0      | 0      |       | 31     |      | 26.3   |      |      |       |      |      |       |
| HCM LOS                  |        |        |       | D      |      | D      |      |      |       |      |      |       |
| Minor Lane/Major Mvmt    | NBLn1  | EBT    | EBR   | WBT    | WBR  | SBLn1  |      |      |       |      |      |       |
| Capacity (veh/h)         | 493    | -      | -     | -      | -    | 605    |      |      |       |      |      |       |
| HCM Lane V/C Ratio       | 0.75   | -      | -     | -      | -    | 0.746  |      |      |       |      |      |       |
| HCM Control Delay (s)    | 31     | -      | -     | -      | -    | 26.3   |      |      |       |      |      |       |
| HCM Lane LOS             | D      | -      | -     | -      | -    | D      |      |      |       |      |      |       |
| HCM 95th %tile Q(veh)    | 6.4    | -      | -     | -      | -    | 6.6    |      |      |       |      |      |       |

12239.00 :: Needham Street  
1: Chestnut Street & Route 9 WB Access Road

2025 No Build Conditions  
Timing Plan: Saturday Midday

| Intersection               |       |       |       |       |      |      |      |      |      |      |      |      |
|----------------------------|-------|-------|-------|-------|------|------|------|------|------|------|------|------|
| Intersection Delay, s/veh  | 21.6  |       |       |       |      |      |      |      |      |      |      |      |
| Intersection LOS           | C     |       |       |       |      |      |      |      |      |      |      |      |
| Movement                   | EBL   | EBT   | EBR   | WBL   | WBT  | WBR  | NBL  | NBT  | NBR  | SBL  | SBT  | SBR  |
| Lane Configurations        |       | ↕     |       |       | ↕    |      |      | ↕    |      |      | ↕    |      |
| Traffic Vol, veh/h         | 2     | 0     | 1     | 65    | 25   | 35   | 60   | 410  | 1    | 1    | 390  | 155  |
| Future Vol, veh/h          | 2     | 0     | 1     | 65    | 25   | 35   | 60   | 410  | 1    | 1    | 390  | 155  |
| Peak Hour Factor           | 0.92  | 0.92  | 0.92  | 0.92  | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Heavy Vehicles, %          | 0     | 0     | 0     | 0     | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    |
| Mvmt Flow                  | 2     | 0     | 1     | 71    | 27   | 38   | 65   | 446  | 1    | 1    | 424  | 168  |
| Number of Lanes            | 0     | 1     | 0     | 0     | 1    | 0    | 0    | 1    | 0    | 0    | 1    | 0    |
| Approach                   | EB    | WB    |       | NB    |      | SB   |      |      |      |      |      |      |
| Opposing Approach          | WB    | EB    |       | SB    |      | NB   |      |      |      |      |      |      |
| Opposing Lanes             | 1     | 1     |       | 1     |      | 1    |      |      |      |      |      |      |
| Conflicting Approach Left  | SB    | NB    |       | EB    |      | WB   |      |      |      |      |      |      |
| Conflicting Lanes Left     | 1     | 1     |       | 1     |      | 1    |      |      |      |      |      |      |
| Conflicting Approach Right | NB    | SB    |       | WB    |      | EB   |      |      |      |      |      |      |
| Conflicting Lanes Right    | 1     | 1     |       | 1     |      | 1    |      |      |      |      |      |      |
| HCM Control Delay          | 10    | 11.5  |       | 20.8  |      | 24.7 |      |      |      |      |      |      |
| HCM LOS                    | A     | B     |       | C     |      | C    |      |      |      |      |      |      |
| Lane                       | NBLn1 | EBLn1 | WBLn1 | SBLn1 |      |      |      |      |      |      |      |      |
| Vol Left, %                | 13%   | 67%   | 52%   | 0%    |      |      |      |      |      |      |      |      |
| Vol Thru, %                | 87%   | 0%    | 20%   | 71%   |      |      |      |      |      |      |      |      |
| Vol Right, %               | 0%    | 33%   | 28%   | 28%   |      |      |      |      |      |      |      |      |
| Sign Control               | Stop  | Stop  | Stop  | Stop  |      |      |      |      |      |      |      |      |
| Traffic Vol by Lane        | 471   | 3     | 125   | 546   |      |      |      |      |      |      |      |      |
| LT Vol                     | 60    | 2     | 65    | 1     |      |      |      |      |      |      |      |      |
| Through Vol                | 410   | 0     | 25    | 390   |      |      |      |      |      |      |      |      |
| RT Vol                     | 1     | 1     | 35    | 155   |      |      |      |      |      |      |      |      |
| Lane Flow Rate             | 512   | 3     | 136   | 593   |      |      |      |      |      |      |      |      |
| Geometry Grp               | 1     | 1     | 1     | 1     |      |      |      |      |      |      |      |      |
| Degree of Util (X)         | 0.73  | 0.006 | 0.241 | 0.803 |      |      |      |      |      |      |      |      |
| Departure Headway (Hd)     | 5.133 | 6.856 | 6.396 | 4.869 |      |      |      |      |      |      |      |      |
| Convergence, Y/N           | Yes   | Yes   | Yes   | Yes   |      |      |      |      |      |      |      |      |
| Cap                        | 707   | 520   | 560   | 742   |      |      |      |      |      |      |      |      |
| Service Time               | 3.164 | 4.929 | 4.447 | 2.899 |      |      |      |      |      |      |      |      |
| HCM Lane V/C Ratio         | 0.724 | 0.006 | 0.243 | 0.799 |      |      |      |      |      |      |      |      |
| HCM Control Delay          | 20.8  | 10    | 11.5  | 24.7  |      |      |      |      |      |      |      |      |
| HCM Lane LOS               | C     | A     | B     | C     |      |      |      |      |      |      |      |      |
| HCM 95th-ile Q             | 6.4   | 0     | 0.9   | 8.4   |      |      |      |      |      |      |      |      |





12239.00 :: Needham Street  
4: Oak Street & Chestnut Street

2025 No Build Conditions  
Timing Plan: Saturday MIDDAY

| Lane Group              | EBL                 | EBT  | EBR       | WBL   | WBT       | WBR  | NBL       | NBT   | NBR       | SBL  | SBT       | SBR  | Ø3 |
|-------------------------|---------------------|------|-----------|-------|-----------|------|-----------|-------|-----------|------|-----------|------|----|
| Lane Configurations     | ↔                   |      | ↔         | ↔     |           | ↔    | ↔         |       | ↔         | ↔    | ↔         | ↔    |    |
| Traffic Volume (vph)    | 20                  | 10   | 350       | 20    | 10        | 2    | 250       | 85    | 25        | 5    | 115       | 20   |    |
| Future Volume (vph)     | 20                  | 10   | 350       | 20    | 10        | 2    | 250       | 85    | 25        | 5    | 115       | 20   |    |
| Ideal Flow (vphpl)      | 1900                | 1900 | 1900      | 1900  | 1900      | 1900 | 1900      | 1900  | 1900      | 1900 | 1900      | 1900 |    |
| Satd. Flow (prot)       | 0                   | 1622 | 0         | 0     | 1826      | 0    | 0         | 1815  | 0         | 0    | 1814      | 0    |    |
| Flt Permitted           | 0.982               |      |           | 0.496 |           |      |           | 0.700 |           |      | 0.987     |      |    |
| Satd. Flow (perm)       | 0                   | 1597 | 0         | 0     | 932       | 0    | 0         | 1310  | 0         | 0    | 1794      | 0    |    |
| Right Turn on Red       | Yes                 |      | Yes       |       | Yes       |      | Yes       |       | Yes       |      | Yes       |      |    |
| Satd. Flow (RTOR)       | 380                 |      | 2         |       | 4         |      | 9         |       | 30        |      | 30        |      |    |
| Link Speed (mph)        | 30                  |      | 30        |       | 30        |      | 30        |       | 30        |      | 30        |      |    |
| Link Distance (ft)      | 2055                |      | 492       |       | 226       |      | 762       |       | 17.3      |      | 17.3      |      |    |
| Travel Time (s)         | 46.7                |      | 11.2      |       | 5.1       |      | 7.7       |       | 7.7       |      | 5.1       |      |    |
| Confl. Peds. (#/hr)     | 1                   |      | 3         | 3     |           | 1    | 5         |       | 7         | 7    |           | 5    |    |
| Confl. Bikes (#/hr)     |                     |      |           |       |           | 2    |           |       |           |      |           |      |    |
| Peak Hour Factor        | 0.92                | 0.92 | 0.92      | 0.92  | 0.92      | 0.92 | 0.92      | 0.92  | 0.92      | 0.92 | 0.92      | 0.92 |    |
| Heavy Vehicles (%)      | 0%                  | 0%   | 0%        | 0%    | 0%        | 0%   | 0%        | 0%    | 0%        | 2%   | 2%        | 2%   |    |
| Shared Lane Traffic (%) | 0                   |      | 0         |       | 35        |      | 0         |       | 391       |      | 0         |      |    |
| Lane Group Flow (vph)   | Perm                | NA   | Perm      | NA    | Perm      | NA   | Perm      | NA    | Perm      | NA   | Perm      | NA   |    |
| Turn Type               | Protected           |      | Protected |       | Protected |      | Protected |       | Protected |      | Protected |      |    |
| Permitted Phases        | 1                   | 1    | 1         | 1     | 1         | 2    | 2         | 2     | 2         | 2    | 2         | 3    |    |
| Detector Phase          | 1                   | 1    | 1         | 1     | 1         | 2    | 2         | 2     | 2         | 2    | 2         | 2    |    |
| Switch Phase            | Minimum Initial (s) |      | 8.0       |       | 8.0       |      | 8.0       |       | 8.0       |      | 8.0       |      |    |
| Minimum Split (s)       | 13.0                |      | 13.0      |       | 13.0      |      | 14.0      |       | 14.0      |      | 14.0      |      |    |
| Total Split (s)         | 35.0                |      | 35.0      |       | 35.0      |      | 36.0      |       | 36.0      |      | 36.0      |      |    |
| Total Split (%)         | 36.5%               |      | 36.5%     |       | 36.5%     |      | 37.5%     |       | 37.5%     |      | 37.5%     |      |    |
| Yellow Time (s)         | 4.0                 |      | 4.0       |       | 4.0       |      | 4.0       |       | 4.0       |      | 4.0       |      |    |
| All-Red Time (s)        | 1.0                 |      | 1.0       |       | 1.0       |      | 2.0       |       | 2.0       |      | 2.0       |      |    |
| Lost Time Adjust (s)    | 0.0                 |      | 0.0       |       | 0.0       |      | 0.0       |       | 0.0       |      | 0.0       |      |    |
| Total Lost Time (s)     | 5.0                 |      | 5.0       |       | 5.0       |      | 6.0       |       | 6.0       |      | 6.0       |      |    |
| Lead/Lag                | Lead                | Lead | Lead      | Lead  | Lead      | Lag  | Lag       | Lag   | Lag       | Lag  | Lag       | Lag  |    |
| Lead-Lag Optimize?      | Min                 |      | Min       |       | Min       |      | Min       |       | Min       |      | Min       |      |    |
| Recall Mode             | 11.2                |      | 11.2      |       | 25.9      |      | 25.9      |       | 25.9      |      | 25.9      |      |    |
| Act Effct Green (s)     | 0.22                |      | 0.22      |       | 0.51      |      | 0.51      |       | 0.51      |      | 0.51      |      |    |
| Actuated g/C Ratio      | 0.64                |      | 0.17      |       | 0.59      |      | 0.17      |       | 0.17      |      | 0.17      |      |    |
| v/c Ratio               | 8.8                 |      | 20.4      |       | 17.1      |      | 9.9       |       | 9.9       |      | 9.9       |      |    |
| Queue Delay             | 0.0                 |      | 0.0       |       | 0.0       |      | 0.0       |       | 0.0       |      | 0.0       |      |    |
| Total Delay             | 8.8                 |      | 20.4      |       | 17.1      |      | 9.9       |       | 9.9       |      | 9.9       |      |    |
| LOS                     | A                   |      | C         |       | B         |      | A         |       | A         |      | A         |      |    |
| Approach Delay          | 8.8                 |      | 20.4      |       | 17.1      |      | 9.9       |       | 9.9       |      | 9.9       |      |    |
| Approach LOS            | A                   |      | C         |       | B         |      | A         |       | A         |      | A         |      |    |
| Queue Length 50th (ft)  | 7                   |      | 7         |       | 7         |      | 15        |       | 15        |      | 15        |      |    |
| Queue Length 95th (ft)  | 86                  |      | 36        |       | #318      |      | 89        |       | 89        |      | 89        |      |    |
| Internal Link Dist (ft) | 1975                |      | 412       |       | 146       |      | 682       |       | 682       |      | 682       |      |    |
| Turn Bay Length (ft)    | 1143                |      | 585       |       | 823       |      | 1129      |       | 1129      |      | 1129      |      |    |
| Base Capacity (vph)     | 0                   |      | 0         |       | 0         |      | 0         |       | 0         |      | 0         |      |    |
| Starvation Cap Reductn  | 0                   |      | 0         |       | 0         |      | 0         |       | 0         |      | 0         |      |    |
| Spillback Cap Reductn   | 0                   |      | 0         |       | 0         |      | 0         |       | 0         |      | 0         |      |    |
| Storage Cap Reductn     | 0                   |      | 0         |       | 0         |      | 0         |       | 0         |      | 0         |      |    |
| Reduced v/c Ratio       | 0.36                |      | 0.06      |       | 0.48      |      | 0.13      |       | 0.13      |      | 0.13      |      |    |

| Intersection Summary                                            |                        |  |
|-----------------------------------------------------------------|------------------------|--|
| Area Type:                                                      | Other                  |  |
| Cycle Length: 96                                                |                        |  |
| Actuated Cycle Length: 51.2                                     |                        |  |
| Natural Cycle: 60                                               |                        |  |
| Control Type: Actuated-Uncoordinated                            |                        |  |
| Maximum v/c Ratio: 0.64                                         |                        |  |
| Intersection Signal Delay: 12.7                                 | Intersection LOS: B    |  |
| Intersection Capacity Utilization 65.0%                         | ICU Level of Service C |  |
| Analysis Period (min) 15                                        |                        |  |
| # 95th percentile volume exceeds capacity, queue may be longer. |                        |  |
| # Queue shown is maximum after two cycles.                      |                        |  |



12239.00 :: Needham Street  
5: Oak Street & Site Driveway

2025 No Build Conditions  
Timing Plan: Saturday MIDDAY

| Intersection             |      |      |      |      |      |      |
|--------------------------|------|------|------|------|------|------|
| Int Delay, s/veh         | 0.7  |      |      |      |      |      |
| Movement                 | WBL  | WBR  | NBT  | NBR  | SBL  | SBT  |
| Lane Configurations      | ↔    | ↔    | ↔    | ↔    | ↔    | ↔    |
| Traffic Vol, veh/h       | 30   | 5    | 355  | 30   | 5    | 480  |
| Future Vol, veh/h        | 30   | 5    | 355  | 30   | 5    | 480  |
| Conflicting Peds, #/hr   | 0    | 2    | 0    | 6    | 6    | 0    |
| Sign Control             | Stop | Stop | Free | Free | Free | Free |
| RT Channelized           | -    | None | -    | None | -    | None |
| Storage Length           | 0    | -    | -    | -    | -    | -    |
| Veh in Median Storage, # | 0    | -    | 0    | -    | -    | 0    |
| Grade, %                 | 0    | -    | 0    | -    | -    | 0    |
| Peak Hour Factor         | 92   | 92   | 92   | 92   | 92   | 92   |
| Heavy Vehicles, %        | 0    | 0    | 0    | 0    | 0    | 0    |
| Mvmt Flow                | 33   | 5    | 386  | 33   | 5    | 522  |

| Major/Minor          | Minor1 | Major1 | Major2 |      |
|----------------------|--------|--------|--------|------|
| Conflicting Flow All | 941    | 410    | 0      | 424  |
| Stage 1              | 408    | -      | -      | -    |
| Stage 2              | 533    | -      | -      | -    |
| Critical Hdwy        | 6.4    | 6.2    | -      | 4.1  |
| Critical Hdwy Stg 1  | 5.4    | -      | -      | -    |
| Critical Hdwy Stg 2  | 5.4    | -      | -      | -    |
| Follow-up Hdwy       | 3.5    | 3.3    | -      | 2.2  |
| Pot Cap-1 Maneuver   | 295    | 646    | -      | 1146 |
| Stage 1              | 676    | -      | -      | -    |
| Stage 2              | 593    | -      | -      | -    |
| Platoon blocked, %   | -      | -      | -      | -    |
| Mov Cap-1 Maneuver   | 292    | 642    | -      | 1144 |
| Mov Cap-2 Maneuver   | 292    | -      | -      | -    |
| Stage 1              | 673    | -      | -      | -    |
| Stage 2              | 589    | -      | -      | -    |

| Approach             | WB   | NB | SB  |
|----------------------|------|----|-----|
| HCM Control Delay, s | 17.9 | 0  | 0.1 |
| HCM LOS              | C    |    |     |

| Minor Lane/Major Mvmt | NBT | NBR | WBLn1 | SBL   | SBT |
|-----------------------|-----|-----|-------|-------|-----|
| Capacity (veh/h)      | -   | -   | 317   | 1144  | -   |
| HCM Lane V/C Ratio    | -   | -   | 0.12  | 0.005 | -   |
| HCM Control Delay (s) | -   | -   | 17.9  | 8.2   | 0   |
| HCM Lane LOS          | -   | -   | C     | A     | A   |
| HCM 95th %ile Q(veh)  | -   | -   | 0.4   | 0     | -   |

2025 No Build Conditions  
Timing Plan: Saturday Midday

| Intersection Summary                                                                                                                                                                                                                                      |                        |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------|
| Area Type:                                                                                                                                                                                                                                                | Other                  |
| Cycle Length:                                                                                                                                                                                                                                             | 114                    |
| Actuated Cycle Length:                                                                                                                                                                                                                                    | 104.3                  |
| Natural Cycle:                                                                                                                                                                                                                                            | 150                    |
| Control Type:                                                                                                                                                                                                                                             | Actuated-Uncoordinated |
| Maximum v/c Ratio:                                                                                                                                                                                                                                        | 1.33                   |
| Intersection Signal Delay:                                                                                                                                                                                                                                | 76.4                   |
| Intersection Capacity Utilization:                                                                                                                                                                                                                        | 104.1%                 |
| Analysis Period (min):                                                                                                                                                                                                                                    | 15                     |
| <p>~ Volume exceeds capacity, queue is theoretically infinite.<br/>           Queue shown is maximum after two cycles.</p> <p># 95th percentile volume exceeds capacity, queue may be longer.<br/>           Queue shown is maximum after two cycles.</p> |                        |
| Intersection LOS: E                                                                                                                                                                                                                                       |                        |
| ICU Level of Service G                                                                                                                                                                                                                                    |                        |

2025 No Build Conditions  
Timing Plan: Saturday Midday

12239.00 :: Needham Street  
7: Needham Street & South Site Driveway

2025 No Build Conditions  
Timing Plan: Saturday MIDDAY

| Intersection             |        |       |        |      |      |      |
|--------------------------|--------|-------|--------|------|------|------|
| Int Delay, s/veh         | 0.2    |       |        |      |      |      |
| Movement                 | EBL    | EBR   | NBL    | NBT  | SBT  | SBR  |
| Lane Configurations      | ↵      |       |        | ↵    | ↵    |      |
| Traffic Vol, veh/h       | 5      | 1     | 2      | 1005 | 955  | 5    |
| Future Vol, veh/h        | 5      | 1     | 2      | 1005 | 955  | 5    |
| Conflicting Peds, #/hr   | 0      | 0     | 8      | 0    | 0    | 8    |
| Sign Control             | Stop   | Stop  | Free   | Free | Free | Free |
| RT Channelized           | -      | None  | -      | None | -    | None |
| Storage Length           | 0      | -     | -      | -    | -    | -    |
| Veh in Median Storage, # | 0      | -     | -      | 0    | 0    | -    |
| Grade, %                 | 0      | -     | -      | 0    | 0    | -    |
| Peak Hour Factor         | 92     | 92    | 92     | 92   | 92   | 92   |
| Heavy Vehicles, %        | 0      | 0     | 0      | 0    | 1    | 1    |
| Mvmt Flow                | 5      | 1     | 2      | 1092 | 1038 | 5    |
| Major/Minor              |        |       |        |      |      |      |
| Minor2                   | Major1 |       | Major2 |      |      |      |
| Conflicting Flow All     | 2146   | 1049  | 1051   | 0    | -    | 0    |
| Stage 1                  | 1049   | -     | -      | -    | -    | -    |
| Stage 2                  | 1097   | -     | -      | -    | -    | -    |
| Critical Hdwy            | 6.4    | 6.2   | 4.1    | -    | -    | -    |
| Critical Hdwy Stg 1      | 5.4    | -     | -      | -    | -    | -    |
| Critical Hdwy Stg 2      | 5.4    | -     | -      | -    | -    | -    |
| Follow-up Hdwy           | 3.5    | 3.3   | 2.2    | -    | -    | -    |
| Pot Cap-1 Maneuver       | 54     | 279   | 670    | -    | -    | -    |
| Stage 1                  | 340    | -     | -      | -    | -    | -    |
| Stage 2                  | 323    | -     | -      | -    | -    | -    |
| Platoon blocked, %       |        |       |        | -    | -    | -    |
| Mov Cap-1 Maneuver       | 53     | 277   | 670    | -    | -    | -    |
| Mov Cap-2 Maneuver       | 53     | -     | -      | -    | -    | -    |
| Stage 1                  | 338    | -     | -      | -    | -    | -    |
| Stage 2                  | 318    | -     | -      | -    | -    | -    |
| Approach                 |        |       |        |      |      |      |
| EB                       | NB     |       | SB     |      |      |      |
| HCM Control Delay, s     | 71     | 0     | -      | 0    | -    | -    |
| HCM LOS                  | F      |       |        |      |      |      |
| Minor Lane/Major Mvmt    |        |       |        |      |      |      |
| NBL                      | NBT    | EBLn1 | SBT    | SBR  |      |      |
| Capacity (veh/h)         | 670    | -     | 61     | -    | -    | -    |
| HCM Lane V/C Ratio       | 0.003  | -     | 0.107  | -    | -    | -    |
| HCM Control Delay (s)    | 10.4   | 0     | 71     | -    | -    | -    |
| HCM Lane LOS             | B      | A     | F      | -    | -    | -    |
| HCM 95th %ile Q(veh)     | 0      | -     | 0.3    | -    | -    | -    |

12239.00 :: Needham Street  
8: Needham Street & Middle Site Driveway/TJMaxx Driveway

2025 No Build Conditions  
Timing Plan: Saturday MIDDAY

| Intersection             |        |      |       |       |       |        |      |      |       |      |      |      |
|--------------------------|--------|------|-------|-------|-------|--------|------|------|-------|------|------|------|
| Int Delay, s/veh         | 3.3    |      |       |       |       |        |      |      |       |      |      |      |
| Movement                 | EBL    | EBT  | EBR   | WBL   | WBT   | WBR    | NBL  | NBT  | NBR   | SBL  | SBT  | SBR  |
| Lane Configurations      |        | ↕    |       |       |       |        | ↵    | ↵    |       | ↵    | ↵    |      |
| Traffic Vol, veh/h       | 10     | 0    | 110   | 5     | 0     | 10     | 100  | 895  | 10    | 10   | 840  | 10   |
| Future Vol, veh/h        | 10     | 0    | 110   | 5     | 0     | 10     | 100  | 895  | 10    | 10   | 840  | 10   |
| Conflicting Peds, #/hr   | 1      | 0    | 0     | 0     | 0     | 1      | 8    | 0    | 7     | 7    | 0    | 8    |
| Sign Control             | Stop   | Stop | Stop  | Stop  | Stop  | Stop   | Free | Free | Free  | Free | Free | Free |
| RT Channelized           | -      | -    | None  | -     | -     | None   | -    | -    | None  | -    | -    | None |
| Storage Length           | -      | -    | -     | -     | -     | -      | 120  | -    | -     | 80   | -    | -    |
| Veh in Median Storage, # | -      | 0    | -     | -     | -     | -      | -    | 0    | -     | -    | 0    | -    |
| Grade, %                 | -      | 0    | -     | -     | 0     | -      | -    | 0    | -     | -    | 0    | -    |
| Peak Hour Factor         | 92     | 92   | 92    | 92    | 92    | 92     | 92   | 92   | 92    | 92   | 92   | 92   |
| Heavy Vehicles, %        | 0      | 0    | 0     | 0     | 0     | 0      | 0    | 0    | 0     | 1    | 1    | 1    |
| Mvmt Flow                | 11     | 0    | 120   | 5     | 0     | 11     | 109  | 973  | 11    | 11   | 913  | 11   |
| Major/Minor              |        |      |       |       |       |        |      |      |       |      |      |      |
| Minor2                   | Major1 |      |       |       |       | Major2 |      |      |       |      |      |      |
| Conflicting Flow All     | 2145   | 2156 | 926   |       |       | 932    | 0    | 0    | 991   | 0    | 0    |      |
| Stage 1                  | 948    | 948  | -     |       |       | -      | -    | -    | -     | -    | -    | -    |
| Stage 2                  | 1197   | 1208 | -     |       |       | -      | -    | -    | -     | -    | -    | -    |
| Critical Hdwy            | 6.4    | 6.5  | 6.2   |       |       | 4.1    | -    | -    | 4.11  | -    | -    | -    |
| Critical Hdwy Stg 1      | 5.4    | 5.5  | -     |       |       | -      | -    | -    | -     | -    | -    | -    |
| Critical Hdwy Stg 2      | 5.4    | 5.5  | -     |       |       | -      | -    | -    | -     | -    | -    | -    |
| Follow-up Hdwy           | 3.5    | 4    | 3.3   |       |       | 2.2    | -    | -    | 2.209 | -    | -    | -    |
| Pot Cap-1 Maneuver       | 54     | 48   | 329   |       |       | 743    | -    | -    | 702   | -    | -    | -    |
| Stage 1                  | 380    | 342  | -     |       |       | -      | -    | -    | -     | -    | -    | -    |
| Stage 2                  | 289    | 258  | -     |       |       | -      | -    | -    | -     | -    | -    | -    |
| Platoon blocked, %       |        |      |       |       |       | -      | -    | -    | -     | -    | -    | -    |
| Mov Cap-1 Maneuver       | 45     | 0    | 327   |       |       | 743    | -    | -    | 701   | -    | -    | -    |
| Mov Cap-2 Maneuver       | 45     | 0    | -     |       |       | -      | -    | -    | -     | -    | -    | -    |
| Stage 1                  | 372    | 0    | -     |       |       | -      | -    | -    | -     | -    | -    | -    |
| Stage 2                  | 245    | 0    | -     |       |       | -      | -    | -    | -     | -    | -    | -    |
| Approach                 |        |      |       |       |       |        |      |      |       |      |      |      |
| EB                       | NB     |      |       |       |       | SB     |      |      |       |      |      |      |
| HCM Control Delay, s     | 44.6   |      |       |       |       | 1.1    |      |      | 0.1   |      |      |      |
| HCM LOS                  | E      |      |       |       |       |        |      |      |       |      |      |      |
| Minor Lane/Major Mvmt    |        |      |       |       |       |        |      |      |       |      |      |      |
| NBL                      | NBT    | NBR  | EBLn1 | SBL   | SBT   | SBR    |      |      |       |      |      |      |
| Capacity (veh/h)         | 743    | -    | -     | 215   | 701   | -      | -    | -    | -     | -    | -    | -    |
| HCM Lane V/C Ratio       | 0.146  | -    | -     | 0.607 | 0.016 | -      | -    | -    | -     | -    | -    | -    |
| HCM Control Delay (s)    | 10.7   | -    | -     | 44.6  | 10.2  | -      | -    | -    | -     | -    | -    | -    |
| HCM Lane LOS             | B      | -    | -     | E     | B     | -      | -    | -    | -     | -    | -    | -    |
| HCM 95th %ile Q(veh)     | 0.5    | -    | -     | 3.5   | 0     | -      | -    | -    | -     | -    | -    | -    |

2025 No Build Conditions  
Timing Plan: Saturday Midday

| Intersection Summary               |                                                               |
|------------------------------------|---------------------------------------------------------------|
| Area Type:                         | Other                                                         |
| Cycle Length:                      | 104                                                           |
| Actuated Cycle Length:             | 78                                                            |
| Natural Cycle:                     | 90                                                            |
| Control Type:                      | Actuated-Uncoordinated                                        |
| Maximum v/c Ratio:                 | 0.69                                                          |
| Intersection Signal Delay:         | 15.1                                                          |
| Intersection Capacity Utilization: | 67.7%                                                         |
| Analysis Period (min)              | 15                                                            |
| #                                  | 95th percentile volume exceeds capacity, queue may be longer. |
|                                    | Queue shown is maximum after two cycles.                      |

Figure 10: Task allocation for the first three days of the experiment. The figure shows two rows of Gantt charts. The top row shows tasks 01, 02, and 04. The bottom row shows tasks 03, 05, and 08. Each task is represented by a horizontal bar with colored segments (green, yellow, red) indicating different states or resources. Arrows indicate the sequence of tasks. The time scale for each task is 16 s, 3 s, and 16 s.

2025 No Build Conditions  
Timing Plan: Saturday Midday

| Minor Lane/Major Mvmt | NBL   | NBT | NBR | EBLn1     | WBLn1    | SBL   | SBT | SBR |
|-----------------------|-------|-----|-----|-----------|----------|-------|-----|-----|
| Capacity (veh/h)      | 801   | -   | -   | 46        | 53       | 696   | -   | -   |
| HCM Lane V/C Ratio    | 0.061 | -   | -   | 3.899     | 2.358    | 0.031 | -   | -   |
| HCM Control Delay (s) | 9.8   | 0   | -   | \$ 1485.7 | \$ 785.4 | 10.3  | -   | -   |
| HCM Lane LOS          | A     | A   | -   | F         | F        | B     | -   | -   |
| HCM 95th %tile Q(veh) | 0.2   | -   | -   | 20        | 12.7     | 0.1   | -   | -   |

Notes  
~: Volume exceeds capacity    \$: Delay exceeds 300s    +: Computation Not Defined    \*: All major volume in platoon

12239.00 :: Needham Street  
11: Needham Street & Jaconnet Street

2025 No Build Conditions  
Timing Plan: Saturday MIDDAY

| Intersection             |        |        |       |        |      |      |
|--------------------------|--------|--------|-------|--------|------|------|
| Int Delay, s/veh         | 2.1    |        |       |        |      |      |
| Movement                 | WBL    | WBR    | NBT   | NBR    | SBL  | SBT  |
| Lane Configurations      | ↔      |        | ↔     |        | ↔    | ↔    |
| Traffic Vol, veh/h       | 25     | 20     | 1000  | 30     | 20   | 760  |
| Future Vol, veh/h        | 25     | 20     | 1000  | 30     | 20   | 760  |
| Conflicting Peds, #/hr   | 0      | 0      | 0     | 38     | 38   | 0    |
| Sign Control             | Stop   | Stop   | Free  | Free   | Free | Free |
| RT Channelized           | -      | None   | -     | None   | -    | None |
| Storage Length           | 0      | -      | -     | -      | 100  | -    |
| Veh in Median Storage, # | 0      | -      | 0     | -      | -    | 0    |
| Grade, %                 | 0      | -      | 0     | -      | -    | 0    |
| Peak Hour Factor         | 92     | 92     | 92    | 92     | 92   | 92   |
| Heavy Vehicles, %        | 0      | 0      | 0     | 0      | 0    | 0    |
| Mvmt Flow                | 27     | 22     | 1087  | 33     | 22   | 826  |
|                          |        |        |       |        |      |      |
| Major/Minor              | Minor1 | Major1 |       | Major2 |      |      |
| Conflicting Flow All     | 2011   | 1141   | 0     | 0      | 1158 | 0    |
| Stage 1                  | 1141   | -      | -     | -      | -    | -    |
| Stage 2                  | 870    | -      | -     | -      | -    | -    |
| Critical Hdwy            | 6.4    | 6.2    | -     | -      | 4.1  | -    |
| Critical Hdwy Stg 1      | 5.4    | -      | -     | -      | -    | -    |
| Critical Hdwy Stg 2      | 5.4    | -      | -     | -      | -    | -    |
| Follow-up Hdwy           | 3.5    | 3.3    | -     | -      | 2.2  | -    |
| Pot Cap-1 Maneuver       | 66     | 247    | -     | -      | 611  | -    |
| Stage 1                  | 307    | -      | -     | -      | -    | -    |
| Stage 2                  | 413    | -      | -     | -      | -    | -    |
| Platoon blocked, %       |        | -      | -     | -      | -    | -    |
| Mov Cap-1 Maneuver       | 62     | 239    | -     | -      | 611  | -    |
| Mov Cap-2 Maneuver       | 62     | -      | -     | -      | -    | -    |
| Stage 1                  | 297    | -      | -     | -      | -    | -    |
| Stage 2                  | 398    | -      | -     | -      | -    | -    |
|                          |        |        |       |        |      |      |
| Approach                 | WB     | NB     |       | SB     |      |      |
| HCM Control Delay, s     | 81.8   | 0      |       | 0.3    |      |      |
| HCM LOS                  | F      |        |       |        |      |      |
|                          |        |        |       |        |      |      |
| Minor Lane/Major Mvmt    | NBT    | NBR    | WBLn1 | SBL    | SBT  |      |
| Capacity (veh/h)         | -      | -      | 92    | 611    | -    |      |
| HCM Lane V/C Ratio       | -      | -      | 0.532 | 0.036  | -    |      |
| HCM Control Delay (s)    | -      | -      | 81.8  | 11.1   | -    |      |
| HCM Lane LOS             | -      | -      | F     | B      | -    |      |
| HCM 95th %tile Q(veh)    | -      | -      | 2.4   | 0.1    | -    |      |

12239.00 :: Needham Street  
12: Needham Street & Rockland Street

2025 No Build Conditions  
Timing Plan: Saturday MIDDAY

| Intersection             |                                                                                     |      |                                                                                     |       |                                                                                     |                                                                                     |
|--------------------------|-------------------------------------------------------------------------------------|------|-------------------------------------------------------------------------------------|-------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
| Int Delay, s/veh         | 1                                                                                   |      |                                                                                     |       |                                                                                     |                                                                                     |
| Movement                 | WBL                                                                                 | WBR  | NBT                                                                                 | NBR   | SBL                                                                                 | SBT                                                                                 |
| Lane Configurations      |  |      |  |       |  |  |
| Traffic Vol, veh/h       | 15                                                                                  | 15   | 980                                                                                 | 30    | 20                                                                                  | 765                                                                                 |
| Future Vol, veh/h        | 15                                                                                  | 15   | 980                                                                                 | 30    | 20                                                                                  | 765                                                                                 |
| Conflicting Peds, #/hr   | 0                                                                                   | 1    | 0                                                                                   | 18    | 18                                                                                  | 0                                                                                   |
| Sign Control             | Stop                                                                                | Stop | Free                                                                                | Free  | Free                                                                                | Free                                                                                |
| RT Channelized           | -                                                                                   | None | -                                                                                   | None  | -                                                                                   | None                                                                                |
| Storage Length           | 0                                                                                   | -    | -                                                                                   | -     | 125                                                                                 | -                                                                                   |
| Veh in Median Storage, # | 0                                                                                   | -    | 0                                                                                   | -     | -                                                                                   | 0                                                                                   |
| Grade, %                 | 0                                                                                   | -    | 0                                                                                   | -     | -                                                                                   | 0                                                                                   |
| Peak Hour Factor         | 92                                                                                  | 92   | 92                                                                                  | 92    | 92                                                                                  | 92                                                                                  |
| Heavy Vehicles, %        | 0                                                                                   | 0    | 0                                                                                   | 0     | 0                                                                                   | 0                                                                                   |
| Mvmt Flow                | 16                                                                                  | 16   | 1065                                                                                | 33    | 22                                                                                  | 832                                                                                 |
|                          |                                                                                     |      |                                                                                     |       |                                                                                     |                                                                                     |
| Major/Minor              | Minor1                                                                              |      | Major1                                                                              |       | Major2                                                                              |                                                                                     |
| Conflicting Flow All     | 1975                                                                                | 1101 | 0                                                                                   | 0     | 1116                                                                                | 0                                                                                   |
| Stage 1                  | 1100                                                                                | -    | -                                                                                   | -     | -                                                                                   | -                                                                                   |
| Stage 2                  | 875                                                                                 | -    | -                                                                                   | -     | -                                                                                   | -                                                                                   |
| Critical Hdwy            | 6.4                                                                                 | 6.2  | -                                                                                   | -     | 4.1                                                                                 | -                                                                                   |
| Critical Hdwy Stg 1      | 5.4                                                                                 | -    | -                                                                                   | -     | -                                                                                   | -                                                                                   |
| Critical Hdwy Stg 2      | 5.4                                                                                 | -    | -                                                                                   | -     | -                                                                                   | -                                                                                   |
| Follow-up Hdwy           | 3.5                                                                                 | 3.3  | -                                                                                   | -     | 2.2                                                                                 | -                                                                                   |
| Pot Cap-1 Maneuver       | 69                                                                                  | 260  | -                                                                                   | -     | 633                                                                                 | -                                                                                   |
| Stage 1                  | 322                                                                                 | -    | -                                                                                   | -     | -                                                                                   | -                                                                                   |
| Stage 2                  | 411                                                                                 | -    | -                                                                                   | -     | -                                                                                   | -                                                                                   |
| Platoon blocked, %       |                                                                                     |      | -                                                                                   | -     | -                                                                                   | -                                                                                   |
| Mov Cap-1 Maneuver       | 66                                                                                  | 256  | -                                                                                   | -     | 632                                                                                 | -                                                                                   |
| Mov Cap-2 Maneuver       | 66                                                                                  | -    | -                                                                                   | -     | -                                                                                   | -                                                                                   |
| Stage 1                  | 317                                                                                 | -    | -                                                                                   | -     | -                                                                                   | -                                                                                   |
| Stage 2                  | 397                                                                                 | -    | -                                                                                   | -     | -                                                                                   | -                                                                                   |
|                          |                                                                                     |      |                                                                                     |       |                                                                                     |                                                                                     |
| Approach                 | WB                                                                                  |      | NB                                                                                  |       | SB                                                                                  |                                                                                     |
| HCM Control Delay, s     | 54                                                                                  |      | 0                                                                                   |       | 0.3                                                                                 |                                                                                     |
| HCM LOS                  | F                                                                                   |      |                                                                                     |       |                                                                                     |                                                                                     |
|                          |                                                                                     |      |                                                                                     |       |                                                                                     |                                                                                     |
| Minor Lane/Major Mvmt    |                                                                                     | NBT  | NBR                                                                                 | WBLn1 | SBL                                                                                 | SBT                                                                                 |
| Capacity (veh/h)         | -                                                                                   | -    | -                                                                                   | 105   | 632                                                                                 | -                                                                                   |
| HCM Lane V/C Ratio       | -                                                                                   | -    | -                                                                                   | 0.311 | 0.034                                                                               | -                                                                                   |
| HCM Control Delay (s)    | -                                                                                   | -    | -                                                                                   | 54    | 10.9                                                                                | -                                                                                   |
| HCM Lane LOS             | -                                                                                   | -    | -                                                                                   | F     | B                                                                                   | -                                                                                   |
| HCM 95th %ile Q(veh)     | -                                                                                   | -    | -                                                                                   | 1.2   | 0.1                                                                                 | -                                                                                   |

12239.00 :: Needham Street  
13: Needham Street & Avalon Driveway/Columbia Avenue

2025 No Build Conditions  
Timing Plan: Saturday Midday

| Lane Group              | EBL   | EBT   | EBR   | WBL   | WBT   | WBR  | NBL   | NBT   | NBR  | SBL   | SBT   | SBR  | Ø1   | Ø3   | Ø5   | Ø7   |
|-------------------------|-------|-------|-------|-------|-------|------|-------|-------|------|-------|-------|------|------|------|------|------|
| Lane Configurations     |       |       |       |       |       |      |       |       |      |       |       |      |      |      |      |      |
| Traffic Volume (vph)    | 10    | 0     | 10    | 10    | 2     | 10   | 10    | 975   | 10   | 5     | 765   | 5    |      |      |      |      |
| Future Volume (vph)     | 10    | 0     | 10    | 10    | 2     | 10   | 10    | 975   | 10   | 5     | 765   | 5    |      |      |      |      |
| Ideal Flow (vphpl)      | 1900  | 1900  | 1900  | 1900  | 1900  | 1900 | 1900  | 1900  | 1900 | 1900  | 1900  | 1900 |      |      |      |      |
| Storage Length (ft)     | 0     |       | 50    | 0     |       | 0    | 125   | 0     |      | 100   |       | 0    |      |      |      |      |
| Storage Lanes           | 0     |       | 1     | 0     |       | 0    | 1     | 0     |      | 1     |       | 0    |      |      |      |      |
| Taper Length (ft)       | 25    |       |       | 25    |       |      | 25    |       |      | 25    |       |      |      |      |      |      |
| Satd. Flow (prot)       | 0     | 1805  | 1615  | 0     | 1713  | 0    | 1805  | 1894  | 0    | 1805  | 1897  | 0    |      |      |      |      |
| Flt Permitted           |       |       |       |       |       |      | 0.284 |       |      | 0.157 |       |      |      |      |      |      |
| Satd. Flow (perm)       | 0     | 1867  | 1615  | 0     | 1752  | 0    | 540   | 1894  | 0    | 298   | 1897  | 0    |      |      |      |      |
| Right Turn on Red       |       | Yes   |       |       | Yes   |      |       | Yes   |      |       | Yes   |      |      |      |      |      |
| Satd. Flow (RTOR)       |       | 80    |       |       | 11    |      |       | 1     |      |       | 1     |      |      |      |      |      |
| Link Speed (mph)        |       | 30    |       |       | 30    |      |       | 30    |      |       | 30    |      |      |      |      |      |
| Link Distance (ft)      |       | 190   |       |       | 435   |      |       | 338   |      |       | 1135  |      |      |      |      |      |
| Travel Time (s)         |       | 4.3   |       |       | 9.9   |      |       | 7.7   |      |       | 25.8  |      |      |      |      |      |
| Confl. Peds. (#/hr)     | 6     |       |       |       |       | 6    | 11    |       | 12   | 12    |       | 11   |      |      |      |      |
| Confl. Bikes (#/hr)     |       |       |       |       |       |      |       | 2     |      |       |       | 1    |      |      |      |      |
| Peak Hour Factor        | 0.92  | 0.92  | 0.92  | 0.92  | 0.92  | 0.92 | 0.92  | 0.92  | 0.92 | 0.92  | 0.92  | 0.92 |      |      |      |      |
| Heavy Vehicles (%)      | 0%    | 0%    | 0%    | 0%    | 0%    | 0%   | 0%    | 0%    | 0%   | 0%    | 0%    | 0%   |      |      |      |      |
| Shared Lane Traffic (%) |       |       |       |       |       |      |       |       |      |       |       |      |      |      |      |      |
| Lane Group Flow (vph)   | 0     | 11    | 11    | 0     | 24    | 0    | 11    | 1071  | 0    | 5     | 837   | 0    |      |      |      |      |
| Turn Type               | Perm  | NA    | Perm  | Perm  | NA    |      | Perm  | NA    |      | Perm  | NA    |      |      |      |      |      |
| Protected Phases        |       | 4     |       | 8     |       |      | 8     |       | 2    |       | 6     |      | 1    | 3    | 5    | 7    |
| Permitted Phases        | 4     |       | 4     | 8     |       |      | 2     |       |      | 6     |       |      |      |      |      |      |
| Detector Phase          | 4     | 4     | 4     | 8     | 8     |      | 2     | 2     |      | 6     | 6     |      |      |      |      |      |
| Switch Phase            |       |       |       |       |       |      |       |       |      |       |       |      |      |      |      |      |
| Minimum Initial (s)     | 4.0   | 4.0   | 4.0   | 4.0   | 4.0   |      | 10.0  | 10.0  |      | 10.0  | 10.0  |      | 1.0  | 1.0  | 1.0  | 1.0  |
| Minimum Split (s)       | 19.0  | 19.0  | 19.0  | 22.0  | 22.0  |      | 16.0  | 16.0  |      | 20.0  | 20.0  |      | 3.0  | 3.0  | 3.0  | 3.0  |
| Total Split (s)         | 18.0  | 18.0  | 18.0  | 18.0  | 18.0  |      | 71.0  | 71.0  |      | 71.0  | 71.0  |      | 3.0  | 3.0  | 3.0  | 3.0  |
| Total Split (%)         | 18.9% | 18.9% | 18.9% | 18.9% | 18.9% |      | 74.7% | 74.7% |      | 74.7% | 74.7% |      | 3%   | 3%   | 3%   | 3%   |
| Yellow Time (s)         | 4.0   | 4.0   | 4.0   | 4.0   | 4.0   |      | 4.0   | 4.0   |      | 4.0   | 4.0   |      | 2.0  | 2.0  | 2.0  | 2.0  |
| All-Red Time (s)        | 2.0   | 2.0   | 2.0   | 2.0   | 2.0   |      | 2.0   | 2.0   |      | 2.0   | 2.0   |      | 0.0  | 0.0  | 0.0  | 0.0  |
| Lost Time Adjust (s)    | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   |      | 0.0   | 0.0   |      | 0.0   | 0.0   |      |      |      |      |      |
| Total Lost Time (s)     | 6.0   | 6.0   | 6.0   | 6.0   | 6.0   |      | 6.0   | 6.0   |      | 6.0   | 6.0   |      |      |      |      |      |
| Lead/Lag                | Lag   | Lag   | Lag   | Lag   | Lag   |      | Lag   | Lag   |      | Lag   | Lag   |      | Lead | Lead | Lead | Lead |
| Lead-Lag Optimize?      |       |       |       |       |       |      |       |       |      |       |       |      |      |      |      |      |
| Recall Mode             | None  | None  | None  | None  | None  |      | None  | None  |      | None  | None  |      | None | None | None | None |
| Act Effect Green (s)    | 8.1   | 8.1   | 8.1   | 7.8   | 7.8   |      | 42.6  | 42.6  |      | 42.6  | 42.6  |      |      |      |      |      |
| Actuated g/C Ratio      | 0.17  | 0.17  | 0.16  | 0.16  | 0.16  |      | 0.87  | 0.87  |      | 0.87  | 0.87  |      |      |      |      |      |
| v/c Ratio               | 0.04  | 0.03  | 0.08  | 0.08  | 0.08  |      | 0.02  | 0.65  |      | 0.02  | 0.51  |      |      |      |      |      |
| Control Delay           | 27.9  | 0.2   | 22.6  | 4.2   | 8.7   |      | 4.4   | 5.8   |      | 4.4   | 5.8   |      |      |      |      |      |
| Queue Delay             | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   |      | 0.0   | 0.0   |      | 0.0   | 0.0   |      |      |      |      |      |
| Total Delay             | 27.9  | 0.2   | 22.6  | 4.2   | 8.7   |      | 4.4   | 5.8   |      | 4.4   | 5.8   |      |      |      |      |      |
| LOS                     | C     | A     | C     | C     | A     |      | A     | A     |      | A     | A     |      |      |      |      |      |
| Approach Delay          | 14.0  |       | 22.6  |       | 8.6   |      |       | 5.8   |      |       |       |      |      |      |      |      |
| Approach LOS            | B     |       | C     |       | A     |      |       | A     |      |       |       |      |      |      |      |      |
| Queue Length 50th (ft)  | 2     | 0     | 3     |       | 0     | 0    |       | 0     | 0    |       | 0     |      |      |      |      |      |
| Queue Length 95th (ft)  | 21    | 0     | 30    |       | 8     | #751 |       | 5     | 422  |       |       |      |      |      |      |      |
| Internal Link Dist (ft) | 110   |       | 355   |       | 258   |      |       | 1055  |      |       |       |      |      |      |      |      |
| Turn Bay Length (ft)    |       | 50    |       |       | 125   |      |       | 100   |      |       |       |      |      |      |      |      |
| Base Capacity (vph)     | 670   | 631   |       | 625   | 503   | 1764 |       | 277   | 1767 |       |       |      |      |      |      |      |
| Starvation Cap Reductn  | 0     | 0     | 0     | 0     | 0     | 0    |       | 0     | 0    |       |       |      |      |      |      |      |
| Spillback Cap Reductn   | 0     | 0     | 0     | 0     | 0     | 0    |       | 0     | 0    |       |       |      |      |      |      |      |
| Storage Cap Reductn     | 0     | 0     | 0     | 0     | 0     | 0    |       | 0     | 0    |       |       |      |      |      |      |      |
| Reduced v/c Ratio       | 0.02  | 0.02  |       | 0.04  |       | 0.02 | 0.61  |       | 0.02 | 0.47  |       |      |      |      |      |      |

| Intersection Summary                                            |                        |
|-----------------------------------------------------------------|------------------------|
| Area Type:                                                      | Other                  |
| Cycle Length: 95                                                |                        |
| Actuated Cycle Length: 48.8                                     |                        |
| Natural Cycle: 80                                               |                        |
| Control Type: Actuated-Uncoordinated                            |                        |
| Maximum v/c Ratio: 0.65                                         |                        |
| Intersection Signal Delay: 7.7                                  | Intersection LOS: A    |
| Intersection Capacity Utilization 71.1%                         | ICU Level of Service C |
| Analysis Period (min) 15                                        |                        |
| # 95th percentile volume exceeds capacity, queue may be longer. |                        |
| Queue shown is maximum after two cycles.                        |                        |

Splits and Phases: 13: Needham Street & Avalon Driveway/Columbia Avenue



12239.00 :: Needham Street  
14: Winchester Street & Needham Street/Dedham Street

2025 No Build Conditions  
Timing Plan: Saturday Midday

|                         |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|-------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
| Lane Group              | EBL                                                                                 | EBT                                                                                 | EBR                                                                                 | WBL                                                                                 | WBT                                                                                 | WBR                                                                                 | NBL                                                                                 | NBT                                                                                 | NBR                                                                                 | SBL                                                                                 | SBT                                                                                 | SBR                                                                                 | Ø1                                                                                  | Ø3                                                                                  | Ø5                                                                                  | Ø7                                                                                  |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Lane Configurations     |  |  |                                                                                     |                                                                                     |  |                                                                                     |  |  |                                                                                     |                                                                                     |  |  |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Traffic Volume (vph)    | 780                                                                                 | 140                                                                                 | 75                                                                                  | 20                                                                                  | 140                                                                                 | 90                                                                                  | 40                                                                                  | 220                                                                                 | 10                                                                                  | 50                                                                                  | 215                                                                                 | 600                                                                                 |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Future Volume (vph)     | 780                                                                                 | 140                                                                                 | 75                                                                                  | 20                                                                                  | 140                                                                                 | 90                                                                                  | 40                                                                                  | 220                                                                                 | 10                                                                                  | 50                                                                                  | 215                                                                                 | 600                                                                                 |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Ideal Flow (vphpl)      | 1900                                                                                | 1900                                                                                | 1900                                                                                | 1900                                                                                | 1900                                                                                | 1900                                                                                | 1900                                                                                | 1900                                                                                | 1900                                                                                | 1900                                                                                | 1900                                                                                | 1900                                                                                |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Storage Length (ft)     | 340                                                                                 |                                                                                     | 75                                                                                  | 0                                                                                   |                                                                                     | 0                                                                                   | 100                                                                                 |                                                                                     |                                                                                     | 0                                                                                   | 0                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Storage Lanes           | 1                                                                                   |                                                                                     | 1                                                                                   | 0                                                                                   |                                                                                     | 0                                                                                   | 1                                                                                   |                                                                                     |                                                                                     | 0                                                                                   | 0                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Taper Length (ft)       | 25                                                                                  |                                                                                     |                                                                                     | 25                                                                                  |                                                                                     |                                                                                     | 25                                                                                  |                                                                                     |                                                                                     | 25                                                                                  |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Satd. Flow (prot)       | 3502                                                                                | 1771                                                                                | 0                                                                                   | 0                                                                                   | 1780                                                                                | 0                                                                                   | 1805                                                                                | 1883                                                                                | 0                                                                                   | 0                                                                                   | 1864                                                                                | 1599                                                                                |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Flt Permitted           | 0.950                                                                               |                                                                                     |                                                                                     |                                                                                     | 0.996                                                                               |                                                                                     | 0.449                                                                               |                                                                                     |                                                                                     | 0.790                                                                               |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Satd. Flow (perm)       | 3425                                                                                | 1771                                                                                | 0                                                                                   | 0                                                                                   | 1777                                                                                | 0                                                                                   | 850                                                                                 | 1883                                                                                | 0                                                                                   | 0                                                                                   | 1483                                                                                | 1599                                                                                |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Right Turn on Red       |                                                                                     |                                                                                     | Yes                                                                                 |                                                                                     |                                                                                     | Yes                                                                                 |                                                                                     |                                                                                     | No                                                                                  |                                                                                     | Yes                                                                                 |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Satd. Flow (RTOR)       |                                                                                     | 26                                                                                  |                                                                                     |                                                                                     | 23                                                                                  |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     | 380                                                                                 |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Link Speed (mph)        |                                                                                     | 30                                                                                  |                                                                                     |                                                                                     | 30                                                                                  |                                                                                     |                                                                                     | 30                                                                                  |                                                                                     |                                                                                     | 30                                                                                  |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Link Distance (ft)      |                                                                                     | 1135                                                                                |                                                                                     |                                                                                     | 451                                                                                 |                                                                                     |                                                                                     | 634                                                                                 |                                                                                     |                                                                                     | 722                                                                                 |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Travel Time (s)         |                                                                                     | 25.8                                                                                |                                                                                     |                                                                                     | 10.3                                                                                |                                                                                     |                                                                                     | 14.4                                                                                |                                                                                     |                                                                                     | 16.4                                                                                |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Confl. Peds. (#/hr)     | 8                                                                                   |                                                                                     | 4                                                                                   | 4                                                                                   |                                                                                     | 8                                                                                   | 4                                                                                   |                                                                                     | 5                                                                                   | 5                                                                                   |                                                                                     | 4                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Confl. Bikes (#/hr)     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     | 1                                                                                   |                                                                                     |                                                                                     |                                                                                     | 1                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Peak Hour Factor        | 0.92                                                                                | 0.92                                                                                | 0.92                                                                                | 0.92                                                                                | 0.92                                                                                | 0.92                                                                                | 0.92                                                                                | 0.92                                                                                | 0.92                                                                                | 0.92                                                                                | 0.92                                                                                | 0.92                                                                                |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Heavy Vehicles (%)      | 0%                                                                                  | 0%                                                                                  | 0%                                                                                  | 0%                                                                                  | 0%                                                                                  | 0%                                                                                  | 0%                                                                                  | 0%                                                                                  | 0%                                                                                  | 1%                                                                                  | 1%                                                                                  | 1%                                                                                  |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Shared Lane Traffic (%) |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Lane Group Flow (vph)   | 848                                                                                 | 234                                                                                 | 0                                                                                   | 0                                                                                   | 272                                                                                 | 0                                                                                   | 43                                                                                  | 250                                                                                 | 0                                                                                   | 0                                                                                   | 288                                                                                 | 652                                                                                 |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Turn Type               | Split                                                                               | NA                                                                                  |                                                                                     | Split                                                                               | NA                                                                                  |                                                                                     | Perm                                                                                | NA                                                                                  |                                                                                     | Perm                                                                                | NA                                                                                  | pt+ov                                                                               |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Protected Phases        | 2                                                                                   | 2                                                                                   |                                                                                     | 6                                                                                   | 6                                                                                   |                                                                                     | 4                                                                                   |                                                                                     | 8                                                                                   | 2                                                                                   | 8                                                                                   |                                                                                     | 1                                                                                   | 3                                                                                   | 5                                                                                   | 7                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Permitted Phases        | 2                                                                                   | 2                                                                                   |                                                                                     | 6                                                                                   | 6                                                                                   |                                                                                     | 4                                                                                   |                                                                                     | 8                                                                                   | 8                                                                                   | 8                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Detector Phase          | 2                                                                                   | 2                                                                                   |                                                                                     | 6                                                                                   | 6                                                                                   |                                                                                     | 4                                                                                   | 4                                                                                   | 4                                                                                   | 8                                                                                   | 8                                                                                   | 2                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Switch Phase            |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Minimum Initial (s)     | 10.0                                                                                | 10.0                                                                                |                                                                                     | 6.0                                                                                 | 6.0                                                                                 |                                                                                     | 6.0                                                                                 | 6.0                                                                                 |                                                                                     | 6.0                                                                                 | 6.0                                                                                 |                                                                                     | 1.0                                                                                 | 1.0                                                                                 | 1.0                                                                                 | 1.0                                                                                 |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Minimum Split (s)       | 17.0                                                                                | 17.0                                                                                |                                                                                     | 19.0                                                                                | 19.0                                                                                |                                                                                     | 20.0                                                                                | 20.0                                                                                |                                                                                     | 36.0                                                                                | 36.0                                                                                |                                                                                     | 3.0                                                                                 | 3.0                                                                                 | 3.0                                                                                 | 3.0                                                                                 |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Total Split (s)         | 37.0                                                                                | 37.0                                                                                |                                                                                     | 21.0                                                                                | 21.0                                                                                |                                                                                     | 37.0                                                                                | 37.0                                                                                |                                                                                     | 37.0                                                                                | 37.0                                                                                |                                                                                     | 3.0                                                                                 | 3.0                                                                                 | 3.0                                                                                 | 3.0                                                                                 |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Total Split (%)         | 35.6%                                                                               | 35.6%                                                                               |                                                                                     | 20.2%                                                                               | 20.2%                                                                               |                                                                                     | 35.6%                                                                               | 35.6%                                                                               |                                                                                     | 35.6%                                                                               | 35.6%                                                                               |                                                                                     | 3%                                                                                  | 3%                                                                                  | 3%                                                                                  | 3%                                                                                  |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Yellow Time (s)         | 4.0                                                                                 | 4.0                                                                                 |                                                                                     | 3.0                                                                                 | 3.0                                                                                 |                                                                                     | 4.0                                                                                 | 4.0                                                                                 |                                                                                     | 4.0                                                                                 | 4.0                                                                                 |                                                                                     | 2.0                                                                                 | 2.0                                                                                 | 2.0                                                                                 | 2.0                                                                                 |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| All-Red Time (s)        | 3.0                                                                                 | 3.0                                                                                 |                                                                                     | 3.0                                                                                 | 3.0                                                                                 |                                                                                     | 3.0                                                                                 | 3.0                                                                                 |                                                                                     | 3.0                                                                                 | 3.0                                                                                 |                                                                                     | 0.0                                                                                 | 0.0                                                                                 | 0.0                                                                                 | 0.0                                                                                 |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Lost Time Adjust (s)    | 0.0                                                                                 | 0.0                                                                                 |                                                                                     | 0.0                                                                                 | 0.0                                                                                 |                                                                                     | 0.0                                                                                 | 0.0                                                                                 |                                                                                     | 0.0                                                                                 | 0.0                                                                                 |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Total Lost Time (s)     | 7.0                                                                                 | 7.0                                                                                 |                                                                                     | 6.0                                                                                 | 7.0                                                                                 |                                                                                     | 7.0                                                                                 | 7.0                                                                                 |                                                                                     | 7.0                                                                                 | 7.0                                                                                 |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Lead/Lag                | Lag                                                                                 | Lag                                                                                 |                                                                                     | Lag                                                                                 | Lag                                                                                 |                                                                                     | Lag                                                                                 | Lag                                                                                 |                                                                                     | Lag                                                                                 | Lag                                                                                 |                                                                                     | Lead                                                                                | Lead                                                                                | Lead                                                                                | Lead                                                                                |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Lead-Lag Optimize?      |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Recall Mode             | None                                                                                | None                                                                                |                                                                                     | None                                                                                | None                                                                                |                                                                                     | None                                                                                | None                                                                                |                                                                                     | None                                                                                | None                                                                                |                                                                                     | None                                                                                | None                                                                                | None                                                                                | None                                                                                |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Act Effect Green (s)    | 27.7                                                                                | 27.7                                                                                |                                                                                     | 15.3                                                                                | 21.6                                                                                |                                                                                     | 21.6                                                                                | 21.6                                                                                |                                                                                     | 21.6                                                                                | 21.6                                                                                |                                                                                     | 55.3                                                                                |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Actuated g/C Ratio      | 0.32                                                                                | 0.32                                                                                |                                                                                     | 0.18                                                                                | 0.25                                                                                |                                                                                     | 0.25                                                                                | 0.25                                                                                |                                                                                     | 0.25                                                                                | 0.64                                                                                |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| v/c Ratio               | 0.76                                                                                | 0.40                                                                                |                                                                                     | 0.82                                                                                | 0.20                                                                                |                                                                                     | 0.53                                                                                | 0.78                                                                                |                                                                                     | 0.78                                                                                | 0.56                                                                                |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Control Delay           | 32.7                                                                                | 24.2                                                                                |                                                                                     | 54.9                                                                                | 29.1                                                                                |                                                                                     | 33.0                                                                                |                                                                                     |                                                                                     | 46.0                                                                                | 4.9                                                                                 |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Queue Delay             | 0.0                                                                                 | 0.0                                                                                 |                                                                                     | 0.0                                                                                 | 0.0                                                                                 |                                                                                     | 0.0                                                                                 | 0.0                                                                                 |                                                                                     | 0.0                                                                                 | 0.0                                                                                 |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Total Delay             | 32.7                                                                                | 24.2                                                                                |                                                                                     | 54.9                                                                                | 29.1                                                                                |                                                                                     | 33.0                                                                                |                                                                                     |                                                                                     | 46.0                                                                                | 4.9                                                                                 |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| LOS                     | C                                                                                   | C                                                                                   |                                                                                     | D                                                                                   | C                                                                                   |                                                                                     | C                                                                                   | C                                                                                   |                                                                                     | D                                                                                   | A                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Approach Delay          |                                                                                     | 30.9                                                                                |                                                                                     | 54.9                                                                                |                                                                                     |                                                                                     | 32.4                                                                                |                                                                                     |                                                                                     | 17.5                                                                                |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Approach LOS            |                                                                                     | C                                                                                   |                                                                                     | D                                                                                   |                                                                                     |                                                                                     | C                                                                                   |                                                                                     |                                                                                     | B                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Queue Length 50th (ft)  | 204                                                                                 | 84                                                                                  |                                                                                     | 134                                                                                 | 19                                                                                  |                                                                                     | 118                                                                                 |                                                                                     |                                                                                     | 147                                                                                 | 50                                                                                  |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Queue Length 95th (ft)  | #352                                                                                | 185                                                                                 |                                                                                     | #337                                                                                | 51                                                                                  |                                                                                     | 212                                                                                 |                                                                                     |                                                                                     | 265                                                                                 | 137                                                                                 |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Internal Link Dist (ft) |                                                                                     | 1055                                                                                |                                                                                     | 371                                                                                 |                                                                                     |                                                                                     | 554                                                                                 |                                                                                     |                                                                                     | 642                                                                                 |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Turn Bay Length (ft)    | 340                                                                                 |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     | 100                                                                                 |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Base Capacity (vph)     | 1237                                                                                | 642                                                                                 |                                                                                     | 333                                                                                 | 300                                                                                 |                                                                                     | 665                                                                                 |                                                                                     |                                                                                     | 524                                                                                 | 1190                                                                                |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Starvation Cap Reductn  | 0                                                                                   | 0                                                                                   |                                                                                     | 0                                                                                   | 0                                                                                   |                                                                                     | 0                                                                                   | 0                                                                                   |                                                                                     | 0                                                                                   | 0                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Spillback Cap Reductn   | 0                                                                                   | 0                                                                                   |                                                                                     | 0                                                                                   | 0                                                                                   |                                                                                     | 0                                                                                   | 0                                                                                   |                                                                                     | 0                                                                                   | 0                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Storage Cap Reductn     | 0                                                                                   | 0                                                                                   |                                                                                     | 0                                                                                   | 0                                                                                   |                                                                                     | 0                                                                                   | 0                                                                                   |                                                                                     | 0                                                                                   | 0                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Reduced v/c Ratio       | 0.69                                                                                | 0.36                                                                                |                                                                                     | 0.82                                                                                | 0.14                                                                                |                                                                                     | 0.38                                                                                |                                                                                     |                                                                                     | 0.55                                                                                | 0.55                                                                                |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |

12239.00 :: Needham Street  
15: Winchester Street & Route 9 EB Access Road

2025 No Build Conditions  
Timing Plan: Saturday Midday

| Lane Group              | WBL   | WBR    | NBT  | NBR    | SBL    | SBT     | Ø2   | Ø3   | Ø4   | Ø5   | Ø6   |
|-------------------------|-------|--------|------|--------|--------|---------|------|------|------|------|------|
| Lane Configurations     | ↖ ↗   | ↖ ↗    | ↖ ↗  | ↖ ↗    | ↖ ↗    | ↖ ↗     |      |      |      |      |      |
| Traffic Volume (vph)    | 100   | 200    | 760  | 320    | 140    | 770     |      |      |      |      |      |
| Future Volume (vph)     | 100   | 200    | 760  | 320    | 140    | 770     |      |      |      |      |      |
| Ideal Flow (vphpl)      | 1900  | 1900   | 1900 | 1900   | 1900   | 1900    |      |      |      |      |      |
| Storage Length (ft)     | 200   | 0      | 100  | 0      |        |         |      |      |      |      |      |
| Storage Lanes           | 1     | 1      |      | 1      |        |         |      |      |      |      |      |
| Taper Length (ft)       | 25    |        |      | 25     |        |         |      |      |      |      |      |
| Satd. Flow (prot)       | 1805  | 1615   | 1900 | 1615   | 1805   | 1900    |      |      |      |      |      |
| Flt Permitted           | 0.950 |        |      | 0.073  |        |         |      |      |      |      |      |
| Satd. Flow (perm)       | 1805  | 1615   | 1900 | 1576   | 139    | 1900    |      |      |      |      |      |
| Right Turn on Red       |       | Yes    |      | Yes    |        |         |      |      |      |      |      |
| Satd. Flow (RTOR)       |       | 184    |      | 101    |        |         |      |      |      |      |      |
| Link Speed (mph)        | 30    |        | 30   |        | 30     |         |      |      |      |      |      |
| Link Distance (ft)      | 443   |        | 400  |        | 252    |         |      |      |      |      |      |
| Travel Time (s)         | 10.1  |        | 9.1  |        | 5.7    |         |      |      |      |      |      |
| Confl. Peds. (#/hr)     |       |        |      | 1      | 1      |         |      |      |      |      |      |
| Peak Hour Factor        | 0.92  | 0.92   | 0.92 | 0.92   | 0.92   | 0.92    |      |      |      |      |      |
| Heavy Vehicles (%)      | 0%    | 0%     | 0%   | 0%     | 0%     | 0%      |      |      |      |      |      |
| Shared Lane Traffic (%) |       |        |      |        |        |         |      |      |      |      |      |
| Lane Group Flow (vph)   | 109   | 217    | 826  | 348    | 152    | 837     |      |      |      |      |      |
| Turn Type               | Prot. | custom | NA   | custom | custom | NA      |      |      |      |      |      |
| Protected Phases        | 5 6   | 1 5 6  | 2 3  | 5 6    | 1      | 1 2 3 4 | 2    | 3    | 4    | 5    | 6    |
| Permitted Phases        |       |        |      | 2      | 2      |         |      |      |      |      |      |
| Detector Phase          | 5 6   | 1 5 6  | 2 3  | 5 6    | 1      | 1 2 3 4 |      |      |      |      |      |
| Switch Phase            |       |        |      |        |        |         |      |      |      |      |      |
| Minimum Initial (s)     |       |        |      |        | 4.0    |         | 10.0 | 10.0 | 4.0  | 4.0  | 4.0  |
| Minimum Split (s)       |       |        |      |        | 10.0   |         | 25.0 | 27.0 | 10.0 | 11.0 | 9.0  |
| Total Split (s)         |       |        |      |        | 23.0   |         | 61.0 | 28.0 | 10.0 | 27.0 | 9.0  |
| Total Split (%)         |       |        |      |        | 14.6%  |         | 39%  | 18%  | 6%   | 17%  | 6%   |
| Yellow Time (s)         |       |        |      |        | 4.0    |         | 4.0  | 4.0  | 4.0  | 3.0  | 3.0  |
| All-Red Time (s)        |       |        |      |        | 2.0    |         | 2.0  | 2.0  | 4.0  | 3.0  | 2.0  |
| Lost Time Adjust (s)    |       |        |      |        | 0.0    |         |      |      |      |      |      |
| Total Lost Time (s)     |       |        |      |        | 6.0    |         |      |      |      |      |      |
| Lead/Lag                |       |        |      | Lead   |        |         | Lag  | Lead | Lag  | Lead | Lag  |
| Lead-Lag Optimize?      |       |        |      |        |        |         |      |      |      |      |      |
| Recall Mode             |       |        |      | None   |        |         | None | None | None | None | None |
| Act Effct Green (s)     | 29.0  | 53.0   | 83.0 | 83.0   | 72.0   | 116.0   |      |      |      |      |      |
| Actuated g/C Ratio      | 0.18  | 0.34   | 0.53 | 0.53   | 0.46   | 0.73    |      |      |      |      |      |
| v/c Ratio               | 0.33  | 0.33   | 0.83 | 0.39   | 0.63   | 0.60    |      |      |      |      |      |
| Control Delay           | 59.3  | 9.1    | 40.3 | 9.4    | 54.3   | 6.9     |      |      |      |      |      |
| Queue Delay             | 0.0   | 0.9    | 1.9  | 0.0    | 0.0    | 13.8    |      |      |      |      |      |
| Total Delay             | 59.3  | 9.9    | 42.2 | 9.4    | 54.3   | 20.7    |      |      |      |      |      |
| LOS                     | E     | A      | D    | A      | D      | C       |      |      |      |      |      |
| Approach Delay          | 26.4  |        | 32.5 |        | 25.9   |         |      |      |      |      |      |
| Approach LOS            | C     |        | C    |        | C      |         |      |      |      |      |      |
| Queue Length 50th (ft)  | 99    | 23     | 701  | 80     | 119    | 196     |      |      |      |      |      |
| Queue Length 95th (ft)  | 162   | 88     | 905  | 123    | m132   | m210    |      |      |      |      |      |
| Internal Link Dist (ft) | 363   |        | 320  |        | 172    |         |      |      |      |      |      |
| Turn Bay Length (ft)    | 200   |        |      | 100    |        |         |      |      |      |      |      |
| Base Capacity (vph)     | 331   | 664    | 998  | 883    | 242    | 1394    |      |      |      |      |      |
| Starvation Cap Reductn  | 0     | 0      | 34   | 0      | 0      | 547     |      |      |      |      |      |
| Spillback Cap Reductn   | 0     | 232    | 73   | 0      | 0      | 0       |      |      |      |      |      |
| Storage Cap Reductn     | 0     | 0      | 0    | 0      | 0      | 0       |      |      |      |      |      |
| Reduced v/c Ratio       | 0.33  | 0.50   | 0.89 | 0.39   | 0.63   | 0.99    |      |      |      |      |      |

| Intersection Summary                                              |                        |  |  |  |  |  |  |  |  |  |  |
|-------------------------------------------------------------------|------------------------|--|--|--|--|--|--|--|--|--|--|
| Area Type:                                                        | Other                  |  |  |  |  |  |  |  |  |  |  |
| Cycle Length: 158                                                 |                        |  |  |  |  |  |  |  |  |  |  |
| Actuated Cycle Length: 158                                        |                        |  |  |  |  |  |  |  |  |  |  |
| Natural Cycle: 115                                                |                        |  |  |  |  |  |  |  |  |  |  |
| Control Type: Actuated-Uncoordinated                              |                        |  |  |  |  |  |  |  |  |  |  |
| Maximum v/c Ratio: 0.99                                           |                        |  |  |  |  |  |  |  |  |  |  |
| Intersection Signal Delay: 29.0                                   | Intersection LOS: C    |  |  |  |  |  |  |  |  |  |  |
| Intersection Capacity Utilization 69.1%                           | ICU Level of Service C |  |  |  |  |  |  |  |  |  |  |
| Analysis Period (min) 15                                          |                        |  |  |  |  |  |  |  |  |  |  |
| m Volume for 95th percentile queue is metered by upstream signal. |                        |  |  |  |  |  |  |  |  |  |  |



Lanes, Volumes, Timings  
VHB/MSD  
\\vhb\proj\Wat-LD12239.00\tech\Traffic\Synchro\TIA\_2018\2025 NB\_SAT.syn  
07/03/2018

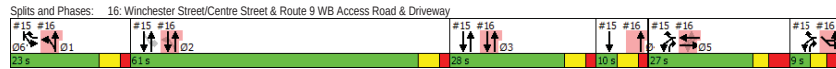
12239.00 :: Needham Street  
16: Winchester Street/Centre Street & Route 9 WB Access Road & Driveway

2025 No Build Conditions  
Timing Plan: Saturday Midday

| Lane Group              | EBL   | EBT   | EBR   | WBL   | WBT  | WBR2 | NBL2   | NBT     | SBT   | SBR   | SEL  | SER  | Ø2   | Ø3   | Ø4   |
|-------------------------|-------|-------|-------|-------|------|------|--------|---------|-------|-------|------|------|------|------|------|
| Lane Configurations     | ↖ ↗   | ↖ ↗   | ↖ ↗   | ↖ ↗   | ↖ ↗  | ↖ ↗  | ↖ ↗    | ↖ ↗     | ↖ ↗   | ↖ ↗   | ↖ ↗  | ↖ ↗  |      |      |      |
| Traffic Volume (vph)    | 1     | 0     | 40    | 180   | 20   | 15   | 195    | 765     | 690   | 130   | 0    | 1    |      |      |      |
| Future Volume (vph)     | 1     | 0     | 40    | 180   | 20   | 15   | 195    | 765     | 690   | 130   | 0    | 1    |      |      |      |
| Ideal Flow (vphpl)      | 1900  | 1900  | 1900  | 1900  | 1900 | 1900 | 1900   | 1900    | 1900  | 1900  | 1900 | 1900 |      |      |      |
| Storage Length (ft)     | 0     | 0     | 100   |       |      |      |        |         |       |       | 0    | 0    |      |      |      |
| Storage Lanes           | 0     | 0     | 1     |       |      |      |        |         |       |       | 0    | 1    |      |      |      |
| Taper Length (ft)       | 25    |       |       | 25    |      |      |        |         |       |       | 25   |      |      |      |      |
| Satd. Flow (prot)       | 0     | 1621  | 0     | 1805  | 1780 | 0    | 1805   | 1900    | 1838  | 0     | 1611 | 0    |      |      |      |
| Flt Permitted           | 0.995 |       | 0.825 |       |      |      | 0.073  |         |       |       |      |      |      |      |      |
| Satd. Flow (perm)       | 0     | 1614  | 0     | 1561  | 1780 | 0    | 139    | 1900    | 1838  | 0     | 1611 | 0    |      |      |      |
| Right Turn on Red       |       |       | Yes   |       | Yes  |      |        |         |       |       |      |      |      |      |      |
| Satd. Flow (RTOR)       |       |       |       | 180   |      | 180  |        |         |       |       |      |      |      |      |      |
| Link Speed (mph)        |       | 30    |       | 30    |      |      |        | 30      | 30    |       | 30   |      |      |      |      |
| Link Distance (ft)      |       | 401   |       | 460   |      |      |        | 252     | 508   |       | 260  |      |      |      |      |
| Travel Time (s)         |       | 9.1   |       | 10.5  |      |      |        | 5.7     | 11.5  |       | 5.9  |      |      |      |      |
| Confl. Peds. (#/hr)     |       |       | 2     | 2     |      |      | 13     |         |       | 13    |      |      |      |      |      |
| Confl. Bikes (#/hr)     |       |       |       |       |      |      |        |         |       | 4     |      |      |      |      |      |
| Peak Hour Factor        | 0.92  | 0.92  | 0.92  | 0.92  | 0.92 | 0.92 | 0.92   | 0.92    | 0.92  | 0.92  | 0.92 | 0.92 |      |      |      |
| Heavy Vehicles (%)      | 0%    | 0%    | 0%    | 0%    | 0%   | 0%   | 0%     | 0%      | 0%    | 0%    | 2%   | 2%   |      |      |      |
| Shared Lane Traffic (%) |       |       |       |       |      |      |        |         |       |       |      |      |      |      |      |
| Lane Group Flow (vph)   | 0     | 44    | 0     | 196   | 38   | 0    | 212    | 832     | 891   | 0     | 1    | 0    |      |      |      |
| Turn Type               | Perm  | NA    |       | Perm  | NA   |      | custom | NA      | NA    |       | Prot |      |      |      |      |
| Protected Phases        |       | 5     |       | 5     |      |      | 1      | 1 2 3 4 | 2 3   |       | 6    |      | 2    | 3    | 4    |
| Permitted Phases        |       | 5     |       | 5     |      |      | 2      |         |       |       |      |      |      |      |      |
| Detector Phase          |       | 5     |       | 5     |      |      | 1      | 1 2 3 4 | 2 3   |       | 6    |      |      |      |      |
| Switch Phase            |       |       |       |       |      |      |        |         |       |       |      |      |      |      |      |
| Minimum Initial (s)     |       | 4.0   |       | 4.0   |      |      | 4.0    |         |       |       | 4.0  |      | 10.0 | 10.0 | 4.0  |
| Minimum Split (s)       |       | 11.0  |       | 11.0  |      |      | 10.0   |         |       |       | 9.0  |      | 25.0 | 27.0 | 10.0 |
| Total Split (s)         |       | 27.0  |       | 27.0  |      |      | 23.0   |         |       |       | 9.0  |      | 61.0 | 28.0 | 10.0 |
| Total Split (%)         |       | 17.1% |       | 17.1% |      |      | 14.6%  |         |       |       | 5.7% |      | 39%  | 18%  | 6%   |
| Yellow Time (s)         |       | 3.0   |       | 3.0   |      |      | 4.0    |         |       |       | 3.0  |      | 4.0  | 4.0  | 4.0  |
| All-Red Time (s)        |       | 4.0   |       | 4.0   |      |      | 2.0    |         |       |       | 2.0  |      | 2.0  | 2.0  | 2.0  |
| Lost Time Adjust (s)    |       | 0.0   |       | 0.0   |      |      | 0.0    |         |       |       | 0.0  |      |      |      |      |
| Total Lost Time (s)     |       | 7.0   |       | 7.0   |      |      | 6.0    |         |       |       | 5.0  |      |      |      |      |
| Lead/Lag                |       | Lead  |       | Lead  |      |      | Lead   |         |       |       | Lag  |      | Lag  | Lead | Lag  |
| Lead-Lag Optimize?      |       |       |       |       |      |      |        |         |       |       |      |      |      |      |      |
| Recall Mode             |       | None  |       | None  |      |      | None   |         |       |       | None |      | None | None | None |
| Act Effct Green (s)     |       | 20.0  |       | 20.0  |      |      | 72.0   |         | 116.0 | 83.0  | 4.0  |      |      |      |      |
| Actuated g/C Ratio      |       | 0.13  |       | 0.13  |      |      | 0.46   |         | 0.73  | 0.53  | 0.03 |      |      |      |      |
| v/c Ratio               |       | 0.12  |       | 0.99  |      |      | 0.88   |         | 0.60  | 0.92  | 0.03 |      |      |      |      |
| Control Delay           |       | 0.7   |       | 129.9 |      |      | 90.1   |         | 3.3   | 50.6  | 76.0 |      |      |      |      |
| Queue Delay             |       | 0.1   |       | 34.6  |      |      | 0.0    |         | 1.4   | 46.7  | 0.0  |      |      |      |      |
| Total Delay             |       | 0.8   |       | 164.5 |      |      | 90.1   |         | 4.7   | 97.2  | 76.0 |      |      |      |      |
| LOS                     |       | A     |       | F     |      |      | A      |         | F     | A     | E    |      |      |      |      |
| Approach Delay          |       | 0.8   |       | 137.9 |      |      | 22.0   |         | 97.2  | 76.0  |      |      |      |      |      |
| Approach LOS            |       | A     |       | F     |      |      | C      |         | F     | E     |      |      |      |      |      |
| Queue Length 50th (ft)  |       | 0     |       | 205   |      |      | 179    |         | 66    | 829   | 1    |      |      |      |      |
| Queue Length 95th (ft)  |       | 0     |       | #377  |      |      | m#258  |         | 113   | #1135 | 8    |      |      |      |      |
| Internal Link Dist (ft) |       | 321   |       | 380   |      |      | 172    |         | 428   | 180   |      |      |      |      |      |
| Turn Bay Length (ft)    |       |       |       | 100   |      |      |        |         |       |       |      |      |      |      |      |
| Base Capacity (vph)     |       | 361   |       | 197   |      |      | 382    |         | 242   | 1394  | 965  |      | 40   |      |      |
| Starvation Cap Reductn  |       | 0     |       | 0     |      |      | 0      |         | 350   | 279   | 0    |      | 0    |      |      |
| Spillback Cap Reductn   |       | 39    |       | 31    |      |      | 0      |         | 0     | 0     | 0    |      | 0    |      |      |
| Storage Cap Reductn     |       | 0     |       | 0     |      |      | 0      |         | 0     | 0     | 0    |      | 0    |      |      |
| Reduced v/c Ratio       |       | 0.14  |       | 1.18  |      |      | 0.10   |         | 0.88  | 0.80  | 1.30 |      | 0.03 |      |      |

| Intersection Summary                                              |                        |  |
|-------------------------------------------------------------------|------------------------|--|
| Area Type:                                                        | Other                  |  |
| Cycle Length: 158                                                 |                        |  |
| Actuated Cycle Length: 158                                        |                        |  |
| Natural Cycle: 115                                                |                        |  |
| Control Type: Actuated-Uncoordinated                              |                        |  |
| Maximum v/c Ratio: 0.99                                           |                        |  |
| Intersection Signal Delay: 64.2                                   | Intersection LOS: E    |  |
| Intersection Capacity Utilization 95.2%                           | ICU Level of Service F |  |
| Analysis Period (min) 15                                          |                        |  |
| # 95th percentile volume exceeds capacity, queue may be longer.   |                        |  |
| Queue shown is maximum after two cycles.                          |                        |  |
| m Volume for 95th percentile queue is metered by upstream signal. |                        |  |

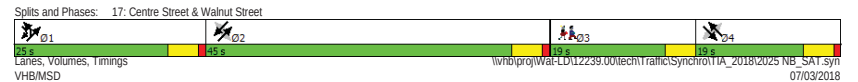
12239.00 :: Needham Street  
16: Winchester Street/Centre Street & Route 9 WB Access Road & Driveway  
2025 No Build Conditions  
Timing Plan: Saturday Midday



12239.00 :: Needham Street  
17: Centre Street & Walnut Street  
2025 No Build Conditions  
Timing Plan: Saturday Midday

| Lane Group              | SEL   | SET   | SER   | NWL   | NWT   | NWR   | NEL   | NET  | NER   | SWL   | SWT  | SWR  | Ø3 |
|-------------------------|-------|-------|-------|-------|-------|-------|-------|------|-------|-------|------|------|----|
| Lane Configurations     |       |       |       |       |       |       |       |      |       |       |      |      |    |
| Traffic Volume (vph)    | 30    | 10    | 355   | 40    | 95    | 5     | 430   | 340  | 10    | 5     | 425  | 65   |    |
| Future Volume (vph)     | 30    | 10    | 355   | 40    | 95    | 5     | 430   | 340  | 10    | 5     | 425  | 65   |    |
| Ideal Flow (vphpl)      | 1900  | 1900  | 1900  | 1900  | 1900  | 1900  | 1900  | 1900 | 1900  | 1900  | 1900 | 1900 |    |
| Storage Length (ft)     | 0     | 0     | 50    | 0     | 0     | 0     | 75    | 0    | 0     | 0     | 0    | 0    |    |
| Storage Lanes           | 0     | 0     | 1     | 0     | 0     | 0     | 1     | 0    | 0     | 0     | 0    | 0    |    |
| Taper Length (ft)       | 25    | 0     | 0     | 25    | 0     | 0     | 25    | 0    | 0     | 25    | 0    | 0    |    |
| Satd. Flow (prot)       | 0     | 1813  | 1599  | 0     | 1864  | 0     | 1805  | 1891 | 0     | 0     | 1859 | 0    |    |
| Flt Permitted           | 0.573 |       |       | 0.888 |       | 0.327 |       |      | 0.997 |       |      |      |    |
| Satd. Flow (perm)       | 0     | 1071  | 1557  | 0     | 1672  | 0     | 620   | 1891 | 0     | 0     | 1853 | 0    |    |
| Right Turn on Red       |       | No    |       |       | No    |       |       | Yes  |       |       | Yes  |      |    |
| Satd. Flow (RTOR)       |       |       |       |       |       |       | 2     |      | 8     |       |      |      |    |
| Link Speed (mph)        | 30    |       |       | 30    |       |       | 30    |      | 30    |       |      |      |    |
| Link Distance (ft)      | 624   |       |       | 387   |       |       | 508   |      | 531   |       |      |      |    |
| Travel Time (s)         | 14.2  |       |       | 8.8   |       |       | 11.5  |      | 12.1  |       |      |      |    |
| Confl. Peds. (#/hr)     | 4     |       | 4     | 4     |       | 4     | 4     |      | 3     | 3     |      | 4    |    |
| Confl. Bikes (#/hr)     |       |       |       |       |       |       |       |      |       |       |      |      | 2  |
| Peak Hour Factor        | 0.92  | 0.92  | 0.92  | 0.92  | 0.92  | 0.92  | 0.92  | 0.92 | 0.92  | 0.92  | 0.92 | 0.92 |    |
| Heavy Vehicles (%)      | 1%    | 1%    | 1%    | 0%    | 0%    | 0%    | 0%    | 0%   | 0%    | 0%    | 0%   | 0%   |    |
| Shared Lane Traffic (%) |       |       |       |       |       |       |       |      |       |       |      |      |    |
| Lane Group Flow (vph)   | 0     | 44    | 386   | 0     | 151   | 0     | 467   | 381  | 0     | 0     | 538  | 0    |    |
| Turn Type               | Perm  | NA    | pm+ov | Perm  | NA    |       | D,P+P | NA   |       | Perm  | NA   |      |    |
| Protected Phases        | 4     | 1     |       | 4     | 1     |       | 1     | 12   |       | 2     |      | 3    |    |
| Permitted Phases        | 4     |       | 4     | 4     |       |       | 2     |      |       | 2     |      |      |    |
| Detector Phase          | 4     | 4     | 1     | 4     | 4     |       | 1     | 12   |       | 2     | 2    |      |    |
| Switch Phase            |       |       |       |       |       |       |       |      |       |       |      |      |    |
| Minimum Initial (s)     | 9.0   | 9.0   | 7.0   | 9.0   | 9.0   |       | 7.0   |      | 6.0   | 6.0   |      | 4.0  |    |
| Minimum Split (s)       | 14.0  | 14.0  | 12.0  | 14.0  | 14.0  |       | 12.0  |      | 11.0  | 11.0  |      | 19.0 |    |
| Total Split (s)         | 19.0  | 19.0  | 25.0  | 19.0  | 19.0  |       | 25.0  |      | 45.0  | 45.0  |      | 19.0 |    |
| Total Split (%)         | 17.6% | 17.6% | 23.1% | 17.6% | 17.6% |       | 23.1% |      | 41.7% | 41.7% |      | 18%  |    |
| Yellow Time (s)         | 4.0   | 4.0   | 4.0   | 4.0   | 4.0   |       | 4.0   |      | 4.0   | 4.0   |      | 4.0  |    |
| All-Red Time (s)        | 1.0   | 1.0   | 1.0   | 1.0   | 1.0   |       | 1.0   |      | 1.0   | 1.0   |      | 0.0  |    |
| Lost Time Adjust (s)    | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   |       | 0.0   |      | 0.0   | 0.0   |      | 0.0  |    |
| Total Lost Time (s)     | 5.0   | 5.0   | 5.0   | 5.0   | 5.0   |       | 5.0   |      | 5.0   | 5.0   |      | 0.0  |    |
| Lead/Lag                | Lag   | Lag   | Lead  | Lag   | Lag   |       | Lead  |      | Lag   | Lag   |      | Lead |    |
| Lead-Lag Optimize?      |       |       |       |       |       |       |       |      |       |       |      |      |    |
| Recall Mode             | Min   | Min   | Max   | Min   | Min   |       | Max   |      | Max   | Max   |      | None |    |
| Act Effct Green (s)     | 12.0  | 32.2  |       | 12.0  |       |       | 60.8  | 65.8 |       | 40.5  |      |      |    |
| Actuated g/C Ratio      | 0.13  | 0.34  |       | 0.13  |       |       | 0.64  | 0.70 |       | 0.43  |      |      |    |
| v/c Ratio               | 0.33  | 0.72  |       | 0.71  |       |       | 0.72  | 0.29 |       | 0.67  |      |      |    |
| Control Delay           | 47.4  | 35.2  |       | 60.8  |       |       | 16.6  | 7.9  |       | 29.0  |      |      |    |
| Queue Delay             | 0.0   | 0.0   |       | 0.0   |       |       | 0.6   | 0.0  |       | 0.0   |      |      |    |
| Total Delay             | 47.4  | 35.2  |       | 60.8  |       |       | 17.2  | 7.9  |       | 29.0  |      |      |    |
| LOS                     | D     | D     |       | E     |       |       | B     | A    |       | C     |      |      |    |
| Approach Delay          | 36.5  |       |       | 60.8  |       |       | 13.1  |      |       | 29.0  |      |      |    |
| Approach LOS            | D     |       |       | E     |       |       | B     |      |       | C     |      |      |    |
| Queue Length 50th (ft)  | 22    | 156   |       | 80    |       |       | 73    |      |       | 215   |      |      |    |
| Queue Length 95th (ft)  | 64    | #352  |       | #192  |       |       | #293  |      |       | 459   |      |      |    |
| Internal Link Dist (ft) | 544   |       |       | 307   |       |       | 428   |      |       | 451   |      |      |    |
| Turn Bay Length (ft)    |       | 50    |       |       |       |       | 75    |      |       |       |      |      |    |
| Base Capacity (vph)     | 160   | 539   |       | 250   |       |       | 651   | 1316 |       | 798   |      |      |    |
| Starvation Cap Reductn  | 0     | 0     |       | 0     |       |       | 33    | 0    |       | 0     |      |      |    |
| Spillback Cap Reductn   | 0     | 0     |       | 0     |       |       | 0     | 0    |       | 0     |      |      |    |
| Storage Cap Reductn     | 0     | 0     |       | 0     |       |       | 0     | 0    |       | 0     |      |      |    |
| Reduced v/c Ratio       | 0.28  | 0.72  |       | 0.60  |       |       | 0.76  | 0.29 |       | 0.67  |      |      |    |

| Intersection Summary               |                                                               |                        |
|------------------------------------|---------------------------------------------------------------|------------------------|
| Area Type:                         | Other                                                         |                        |
| Cycle Length:                      | 108                                                           |                        |
| Actuated Cycle Length:             | 94.6                                                          |                        |
| Natural Cycle:                     | 90                                                            |                        |
| Control Type:                      | Semi Act-Uncoord                                              |                        |
| Maximum v/c Ratio:                 | 0.72                                                          |                        |
| Intersection Signal Delay:         | 26.2                                                          | Intersection LOS: C    |
| Intersection Capacity Utilization: | 77.2%                                                         | ICU Level of Service D |
| Analysis Period (min):             | 15                                                            |                        |
| #                                  | 95th percentile volume exceeds capacity, queue may be longer. |                        |
|                                    | Queue shown is maximum after two cycles.                      |                        |





12239.00 :: Needham Street  
18: Nahanton Street & Winchester Street

2025 No Build Conditions  
Timing Plan: Saturday MIDDAY

| Lane Group              | EBL                                                                               | EBT                                                                               | WBT                                                                               | WBR                                                                               | SBL                                                                               | SBR                                                                               |
|-------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|
| Lane Configurations     |  |  |  |  |  |  |
| Traffic Volume (vph)    | 270                                                                               | 470                                                                               | 505                                                                               | 55                                                                                | 75                                                                                | 295                                                                               |
| Future Volume (vph)     | 270                                                                               | 470                                                                               | 505                                                                               | 55                                                                                | 75                                                                                | 295                                                                               |
| Ideal Flow (vphpl)      | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                              |
| Storage Length (ft)     | 175                                                                               |                                                                                   |                                                                                   |                                                                                   | 0                                                                                 | 75                                                                                |
| Storage Lanes           | 1                                                                                 |                                                                                   |                                                                                   |                                                                                   | 0                                                                                 | 1                                                                                 |
| Taper Length (ft)       | 25                                                                                |                                                                                   |                                                                                   |                                                                                   | 25                                                                                |                                                                                   |
| Satd. Flow (prot)       | 1805                                                                              | 1900                                                                              | 1869                                                                              | 0                                                                                 | 1805                                                                              | 1615                                                                              |
| Flt Permitted           | 0.252                                                                             |                                                                                   |                                                                                   |                                                                                   | 0.950                                                                             |                                                                                   |
| Satd. Flow (perm)       | 479                                                                               | 1900                                                                              | 1869                                                                              | 0                                                                                 | 1805                                                                              | 1615                                                                              |
| Right Turn on Red       |                                                                                   |                                                                                   |                                                                                   | Yes                                                                               |                                                                                   | No                                                                                |
| Satd. Flow (RTOR)       |                                                                                   |                                                                                   | 9                                                                                 |                                                                                   |                                                                                   |                                                                                   |
| Link Speed (mph)        |                                                                                   | 30                                                                                | 30                                                                                |                                                                                   | 30                                                                                |                                                                                   |
| Link Distance (ft)      |                                                                                   | 963                                                                               | 734                                                                               |                                                                                   | 889                                                                               |                                                                                   |
| Travel Time (s)         |                                                                                   | 21.9                                                                              | 16.7                                                                              |                                                                                   | 20.2                                                                              |                                                                                   |
| Confl. Peds. (#/hr)     | 1                                                                                 |                                                                                   |                                                                                   | 1                                                                                 |                                                                                   |                                                                                   |
| Confl. Bikes (#/hr)     |                                                                                   |                                                                                   |                                                                                   | 13                                                                                |                                                                                   |                                                                                   |
| Peak Hour Factor        | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              |
| Heavy Vehicles (%)      | 0%                                                                                | 0%                                                                                | 0%                                                                                | 0%                                                                                | 0%                                                                                | 0%                                                                                |
| Shared Lane Traffic (%) |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| Lane Group Flow (vph)   | 293                                                                               | 511                                                                               | 609                                                                               | 0                                                                                 | 82                                                                                | 321                                                                               |
| Turn Type               | pm+pt                                                                             | NA                                                                                | NA                                                                                |                                                                                   | Prot                                                                              | pt+ov                                                                             |
| Protected Phases        | 5                                                                                 | 2                                                                                 | 6                                                                                 |                                                                                   | 8                                                                                 | 5 8                                                                               |
| Permitted Phases        | 2                                                                                 |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| Detector Phase          | 5                                                                                 | 2                                                                                 | 6                                                                                 |                                                                                   | 8                                                                                 | 5 8                                                                               |
| Switch Phase            |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| Minimum Initial (s)     | 6.0                                                                               | 10.0                                                                              | 10.0                                                                              |                                                                                   | 6.0                                                                               |                                                                                   |
| Minimum Split (s)       | 11.0                                                                              | 15.0                                                                              | 23.0                                                                              |                                                                                   | 10.0                                                                              |                                                                                   |
| Total Split (s)         | 17.0                                                                              | 67.0                                                                              | 50.0                                                                              |                                                                                   | 21.0                                                                              |                                                                                   |
| Total Split (%)         | 19.3%                                                                             | 76.1%                                                                             | 56.8%                                                                             |                                                                                   | 23.9%                                                                             |                                                                                   |
| Yellow Time (s)         | 3.0                                                                               | 3.0                                                                               | 3.0                                                                               |                                                                                   | 3.0                                                                               |                                                                                   |
| All-Red Time (s)        | 2.0                                                                               | 2.0                                                                               | 2.0                                                                               |                                                                                   | 1.0                                                                               |                                                                                   |
| Lost Time Adjust (s)    | 0.0                                                                               | 0.0                                                                               | 0.0                                                                               |                                                                                   | 0.0                                                                               |                                                                                   |
| Total Lost Time (s)     | 5.0                                                                               | 5.0                                                                               | 5.0                                                                               |                                                                                   | 4.0                                                                               |                                                                                   |
| Lead/Lag                | Lead                                                                              |                                                                                   | Lag                                                                               |                                                                                   |                                                                                   |                                                                                   |
| Lead-Lag Optimize?      | Yes                                                                               |                                                                                   | Yes                                                                               |                                                                                   |                                                                                   |                                                                                   |
| Recall Mode             | None                                                                              | C-Min                                                                             | None                                                                              |                                                                                   | None                                                                              |                                                                                   |
| Act Effct Green (s)     | 61.8                                                                              | 61.8                                                                              | 46.1                                                                              |                                                                                   | 17.2                                                                              | 31.9                                                                              |
| Actuated g/C Ratio      | 0.70                                                                              | 0.70                                                                              | 0.52                                                                              |                                                                                   | 0.20                                                                              | 0.36                                                                              |
| v/c Ratio               | 0.59                                                                              | 0.38                                                                              | 0.62                                                                              |                                                                                   | 0.23                                                                              | 0.55                                                                              |
| Control Delay           | 10.2                                                                              | 6.7                                                                               | 19.1                                                                              |                                                                                   | 30.8                                                                              | 25.6                                                                              |
| Queue Delay             | 0.0                                                                               | 0.0                                                                               | 0.0                                                                               |                                                                                   | 0.0                                                                               | 0.0                                                                               |
| Total Delay             | 10.2                                                                              | 6.7                                                                               | 19.1                                                                              |                                                                                   | 30.8                                                                              | 25.6                                                                              |
| LOS                     | B                                                                                 | A                                                                                 | B                                                                                 |                                                                                   | C                                                                                 |                                                                                   |
| Approach Delay          |                                                                                   | 8.0                                                                               | 19.1                                                                              |                                                                                   | 26.7                                                                              |                                                                                   |
| Approach LOS            |                                                                                   | A                                                                                 | B                                                                                 |                                                                                   | C                                                                                 |                                                                                   |
| Queue Length 50th (ft)  | 52                                                                                | 103                                                                               | 228                                                                               |                                                                                   | 38                                                                                | 137                                                                               |
| Queue Length 95th (ft)  | 79                                                                                | 149                                                                               | 346                                                                               |                                                                                   | 78                                                                                | 216                                                                               |
| Internal Link Dist (ft) |                                                                                   | 883                                                                               | 654                                                                               |                                                                                   | 809                                                                               |                                                                                   |
| Turn Bay Length (ft)    | 175                                                                               |                                                                                   |                                                                                   |                                                                                   | 75                                                                                |                                                                                   |
| Base Capacity (vph)     | 522                                                                               | 1361                                                                              | 1014                                                                              |                                                                                   | 375                                                                               | 599                                                                               |
| Starvation Cap Reductn  | 0                                                                                 | 0                                                                                 | 0                                                                                 |                                                                                   | 0                                                                                 | 0                                                                                 |
| Spillback Cap Reductn   | 0                                                                                 | 0                                                                                 | 0                                                                                 |                                                                                   | 0                                                                                 | 0                                                                                 |
| Storage Cap Reductn     | 0                                                                                 | 0                                                                                 | 0                                                                                 |                                                                                   | 0                                                                                 | 0                                                                                 |
| Reduced v/c Ratio       | 0.56                                                                              | 0.38                                                                              | 0.60                                                                              |                                                                                   | 0.22                                                                              | 0.54                                                                              |

| Intersection Summary                                       |                        |
|------------------------------------------------------------|------------------------|
| Area Type:                                                 | Other                  |
| Cycle Length: 88                                           |                        |
| Actuated Cycle Length: 88                                  |                        |
| Offset: 8 (9%), Referenced to phase 2:EBTL, Start of Green |                        |
| Natural Cycle: 60                                          |                        |
| Control Type: Actuated-Coordinated                         |                        |
| Maximum v/c Ratio: 0.62                                    |                        |
| Intersection Signal Delay: 15.8                            | Intersection LOS: B    |
| Intersection Capacity Utilization 61.6%                    | ICU Level of Service B |
| Analysis Period (min) 15                                   |                        |

Splits and Phases: 18: Nahanton Street & Winchester Street



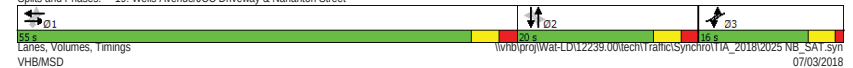
12239.00 :: Needham Street  
19: Wells Avenue/JCC Driveway & Nahanton Street

2025 No Build Conditions  
Timing Plan: Saturday MIDDAY

| Lane Group              | EBL                                                                                 | EBT                                                                                 | EBR                                                                                 | WBL                                                                                 | WBT                                                                                 | WBR                                                                                 | NBL                                                                                 | NBT                                                                                 | NBR                                                                                 | SBL                                                                                 | SBT                                                                                 | SBR                                                                                 |
|-------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
| Lane Configurations     |  |  |  |  |  |  |  |  |  |  |  |  |
| Traffic Volume (vph)    | 20                                                                                  | 560                                                                                 | 140                                                                                 | 190                                                                                 | 580                                                                                 | 30                                                                                  | 215                                                                                 | 5                                                                                   | 140                                                                                 | 40                                                                                  | 2                                                                                   | 35                                                                                  |
| Future Volume (vph)     | 20                                                                                  | 560                                                                                 | 140                                                                                 | 190                                                                                 | 580                                                                                 | 30                                                                                  | 215                                                                                 | 5                                                                                   | 140                                                                                 | 40                                                                                  | 2                                                                                   | 35                                                                                  |
| Ideal Flow (vphpl)      | 1900                                                                                | 1900                                                                                | 1900                                                                                | 1900                                                                                | 1900                                                                                | 1900                                                                                | 1900                                                                                | 1900                                                                                | 1900                                                                                | 1900                                                                                | 1900                                                                                | 1900                                                                                |
| Storage Length (ft)     | 125                                                                                 |                                                                                     | 125                                                                                 | 150                                                                                 |                                                                                     | 0                                                                                   | 0                                                                                   |                                                                                     | 0                                                                                   | 75                                                                                  |                                                                                     | 0                                                                                   |
| Storage Lanes           | 1                                                                                   |                                                                                     | 1                                                                                   |                                                                                     |                                                                                     | 0                                                                                   | 1                                                                                   |                                                                                     | 0                                                                                   | 1                                                                                   |                                                                                     | 0                                                                                   |
| Taper Length (ft)       | 25                                                                                  |                                                                                     | 25                                                                                  |                                                                                     |                                                                                     | 25                                                                                  |                                                                                     |                                                                                     | 25                                                                                  |                                                                                     |                                                                                     | 25                                                                                  |
| Satd. Flow (prot)       | 1805                                                                                | 1900                                                                                | 1615                                                                                | 1805                                                                                | 1884                                                                                | 0                                                                                   | 1805                                                                                | 1624                                                                                | 0                                                                                   | 1805                                                                                | 1628                                                                                | 0                                                                                   |
| Flt Permitted           | 0.222                                                                               |                                                                                     | 0.265                                                                               |                                                                                     |                                                                                     | 0.731                                                                               |                                                                                     | 0.636                                                                               |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Satd. Flow (perm)       | 422                                                                                 | 1900                                                                                | 1570                                                                                | 503                                                                                 | 1884                                                                                | 0                                                                                   | 1389                                                                                | 1624                                                                                | 0                                                                                   | 1208                                                                                | 1628                                                                                | 0                                                                                   |
| Right Turn on Red       |                                                                                     | Yes                                                                                 |                                                                                     |                                                                                     | Yes                                                                                 |                                                                                     |                                                                                     | Yes                                                                                 |                                                                                     |                                                                                     | Yes                                                                                 |                                                                                     |
| Satd. Flow (RTOR)       |                                                                                     | 131                                                                                 |                                                                                     |                                                                                     | 5                                                                                   |                                                                                     |                                                                                     | 152                                                                                 |                                                                                     |                                                                                     | 38                                                                                  |                                                                                     |
| Link Speed (mph)        |                                                                                     | 30                                                                                  |                                                                                     |                                                                                     | 30                                                                                  |                                                                                     |                                                                                     | 30                                                                                  |                                                                                     |                                                                                     | 30                                                                                  |                                                                                     |
| Link Distance (ft)      |                                                                                     | 797                                                                                 |                                                                                     |                                                                                     | 963                                                                                 |                                                                                     |                                                                                     | 598                                                                                 |                                                                                     |                                                                                     | 628                                                                                 |                                                                                     |
| Travel Time (s)         |                                                                                     | 18.1                                                                                |                                                                                     |                                                                                     | 21.9                                                                                |                                                                                     |                                                                                     | 13.6                                                                                |                                                                                     |                                                                                     | 14.3                                                                                |                                                                                     |
| Confl. Peds. (#/hr)     |                                                                                     |                                                                                     | 1                                                                                   | 1                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Confl. Bikes (#/hr)     |                                                                                     |                                                                                     | 10                                                                                  |                                                                                     | 12                                                                                  |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Peak Hour Factor        | 0.92                                                                                | 0.92                                                                                | 0.92                                                                                | 0.92                                                                                | 0.92                                                                                | 0.92                                                                                | 0.92                                                                                | 0.92                                                                                | 0.92                                                                                | 0.92                                                                                | 0.92                                                                                | 0.92                                                                                |
| Heavy Vehicles (%)      | 0%                                                                                  | 0%                                                                                  | 0%                                                                                  | 0%                                                                                  | 0%                                                                                  | 0%                                                                                  | 0%                                                                                  | 0%                                                                                  | 0%                                                                                  | 0%                                                                                  | 0%                                                                                  | 0%                                                                                  |
| Shared Lane Traffic (%) |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Lane Group Flow (vph)   | 22                                                                                  | 609                                                                                 | 152                                                                                 | 207                                                                                 | 663                                                                                 | 0                                                                                   | 234                                                                                 | 157                                                                                 | 0                                                                                   | 43                                                                                  | 40                                                                                  | 0                                                                                   |
| Turn Type               | pm+pt                                                                               | NA                                                                                  | Perm                                                                                | pm+pt                                                                               | NA                                                                                  |                                                                                     | Perm                                                                                | NA                                                                                  |                                                                                     | Perm                                                                                | NA                                                                                  |                                                                                     |
| Protected Phases        | 3                                                                                   | 1                                                                                   |                                                                                     | 3                                                                                   | 1                                                                                   |                                                                                     |                                                                                     | 2                                                                                   |                                                                                     |                                                                                     | 2                                                                                   |                                                                                     |
| Permitted Phases        | 1                                                                                   |                                                                                     | 1                                                                                   | 1                                                                                   |                                                                                     |                                                                                     | 2                                                                                   |                                                                                     |                                                                                     | 2                                                                                   |                                                                                     |                                                                                     |
| Detector Phase          | 3                                                                                   | 1                                                                                   | 1                                                                                   | 3                                                                                   | 1                                                                                   |                                                                                     | 2                                                                                   | 2                                                                                   |                                                                                     | 2                                                                                   | 2                                                                                   |                                                                                     |
| Switch Phase            |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Minimum Initial (s)     | 6.0                                                                                 | 6.0                                                                                 | 6.0                                                                                 | 6.0                                                                                 | 6.0                                                                                 |                                                                                     | 6.0                                                                                 | 6.0                                                                                 |                                                                                     | 6.0                                                                                 | 6.0                                                                                 |                                                                                     |
| Minimum Split (s)       | 10.0                                                                                | 11.0                                                                                | 11.0                                                                                | 10.0                                                                                | 11.0                                                                                |                                                                                     | 11.0                                                                                | 11.0                                                                                |                                                                                     | 11.0                                                                                | 11.0                                                                                |                                                                                     |
| Total Split (s)         | 16.0                                                                                | 55.0                                                                                | 55.0                                                                                | 16.0                                                                                | 55.0                                                                                |                                                                                     | 20.0                                                                                | 20.0                                                                                |                                                                                     | 20.0                                                                                | 20.0                                                                                |                                                                                     |
| Total Split (%)         | 17.6%                                                                               | 60.4%                                                                               | 60.4%                                                                               | 17.6%                                                                               | 60.4%                                                                               |                                                                                     | 22.0%                                                                               | 22.0%                                                                               |                                                                                     | 22.0%                                                                               | 22.0%                                                                               |                                                                                     |
| Yellow Time (s)         | 3.0                                                                                 | 3.0                                                                                 | 3.0                                                                                 | 3.0                                                                                 | 3.0                                                                                 |                                                                                     | 3.0                                                                                 | 3.0                                                                                 |                                                                                     | 3.0                                                                                 | 3.0                                                                                 |                                                                                     |
| All-Red Time (s)        | 1.0                                                                                 | 2.0                                                                                 | 2.0                                                                                 | 1.0                                                                                 | 2.0                                                                                 |                                                                                     | 2.0                                                                                 | 2.0                                                                                 |                                                                                     | 2.0                                                                                 | 2.0                                                                                 |                                                                                     |
| Lost Time Adjust (s)    | 0.0                                                                                 | 0.0                                                                                 | 0.0                                                                                 | 0.0                                                                                 | 0.0                                                                                 |                                                                                     | 0.0                                                                                 | 0.0                                                                                 |                                                                                     | 0.0                                                                                 | 0.0                                                                                 |                                                                                     |
| Total Lost Time (s)     | 4.0                                                                                 | 5.0                                                                                 | 5.0                                                                                 | 4.0                                                                                 | 5.0                                                                                 |                                                                                     | 5.0                                                                                 | 5.0                                                                                 |                                                                                     | 5.0                                                                                 | 5.0                                                                                 |                                                                                     |
| Lead/Lag                |                                                                                     | Lead                                                                                | Lead                                                                                |                                                                                     | Lead                                                                                |                                                                                     | Lag                                                                                 | Lag                                                                                 |                                                                                     | Lag                                                                                 | Lag                                                                                 |                                                                                     |
| Lead-Lag Optimize?      |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Recall Mode             | None                                                                                | None                                                                                | None                                                                                | None                                                                                | None                                                                                |                                                                                     | None                                                                                | None                                                                                |                                                                                     | None                                                                                | None                                                                                |                                                                                     |
| Act Effct Green (s)     | 44.6                                                                                | 35.9                                                                                | 35.9                                                                                | 44.6                                                                                | 35.9                                                                                |                                                                                     | 15.4                                                                                | 15.4                                                                                |                                                                                     | 15.4                                                                                | 15.4                                                                                |                                                                                     |
| Actuated g/C Ratio      | 0.61                                                                                | 0.49                                                                                | 0.49                                                                                | 0.61                                                                                | 0.49                                                                                |                                                                                     | 0.21                                                                                | 0.21                                                                                |                                                                                     | 0.21                                                                                | 0.21                                                                                |                                                                                     |
| v/c Ratio               | 0.05                                                                                | 0.66                                                                                | 0.18                                                                                | 0.47                                                                                | 0.72                                                                                |                                                                                     | 0.80                                                                                | 0.34                                                                                |                                                                                     | 0.17                                                                                | 0.11                                                                                |                                                                                     |
| Control Delay           | 3.9                                                                                 | 17.3                                                                                | 3.0                                                                                 | 8.0                                                                                 | 19.1                                                                                |                                                                                     | 54.5                                                                                | 8.7                                                                                 |                                                                                     | 30.9                                                                                | 12.3                                                                                |                                                                                     |
| Queue Delay             | 0.0                                                                                 | 0.0                                                                                 | 0.0                                                                                 | 0.0                                                                                 | 0.0                                                                                 |                                                                                     | 0.0                                                                                 | 0.0                                                                                 |                                                                                     | 0.0                                                                                 | 0.0                                                                                 |                                                                                     |
| Total Delay             | 3.9                                                                                 | 17.3                                                                                | 3.0                                                                                 | 8.0                                                                                 | 19.1                                                                                |                                                                                     | 54.5                                                                                | 8.7                                                                                 |                                                                                     | 30.9                                                                                | 12.3                                                                                |                                                                                     |
| LOS                     | A                                                                                   | B                                                                                   | A                                                                                   | A                                                                                   | B                                                                                   |                                                                                     | D                                                                                   | A                                                                                   |                                                                                     | C                                                                                   | B                                                                                   |                                                                                     |
| Approach Delay          |                                                                                     | 14.2                                                                                |                                                                                     |                                                                                     | 16.5                                                                                |                                                                                     |                                                                                     | 36.1                                                                                |                                                                                     |                                                                                     | 21.9                                                                                |                                                                                     |
| Approach LOS            |                                                                                     | B                                                                                   |                                                                                     |                                                                                     | B                                                                                   |                                                                                     |                                                                                     | D                                                                                   |                                                                                     |                                                                                     | C                                                                                   |                                                                                     |
| Queue Length 50th (ft)  | 3                                                                                   | 191                                                                                 | 5                                                                                   | 29                                                                                  | 216                                                                                 |                                                                                     | 102                                                                                 | 2                                                                                   |                                                                                     | 16                                                                                  | 1                                                                                   |                                                                                     |
| Queue Length 95th (ft)  | 8                                                                                   | 302                                                                                 | 30                                                                                  | 49                                                                                  | 342                                                                                 |                                                                                     | #280                                                                                | 54                                                                                  |                                                                                     | 52                                                                                  | 28                                                                                  |                                                                                     |
| Internal Link Dist (ft) |                                                                                     | 717                                                                                 |                                                                                     |                                                                                     | 883                                                                                 |                                                                                     |                                                                                     | 518                                                                                 |                                                                                     |                                                                                     | 548                                                                                 |                                                                                     |
| Turn Bay Length (ft)    | 125                                                                                 |                                                                                     | 125                                                                                 | 150                                                                                 |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     | 75                                                                                  |                                                                                     |                                                                                     |
| Base Capacity (vph)     | 510                                                                                 | 1331                                                                                | 1139                                                                                | 550                                                                                 | 1321                                                                                |                                                                                     | 291                                                                                 | 461                                                                                 |                                                                                     | 253                                                                                 | 371                                                                                 |                                                                                     |
| Starvation Cap Reductn  | 0                                                                                   | 0                                                                                   | 0                                                                                   | 0                                                                                   | 0                                                                                   |                                                                                     | 0                                                                                   | 0                                                                                   |                                                                                     | 0                                                                                   | 0                                                                                   |                                                                                     |
| Spillback Cap Reductn   | 0                                                                                   | 0                                                                                   | 0                                                                                   | 0                                                                                   | 0                                                                                   |                                                                                     | 0                                                                                   | 0                                                                                   |                                                                                     | 0                                                                                   | 0                                                                                   |                                                                                     |
| Storage Cap Reductn     | 0                                                                                   | 0                                                                                   | 0                                                                                   | 0                                                                                   | 0                                                                                   |                                                                                     | 0                                                                                   | 0                                                                                   |                                                                                     | 0                                                                                   | 0                                                                                   |                                                                                     |
| Reduced v/c Ratio       | 0.04                                                                                | 0.46                                                                                | 0.13                                                                                | 0.38                                                                                | 0.50                                                                                |                                                                                     | 0.80                                                                                | 0.34                                                                                |                                                                                     | 0.17                                                                                | 0.11                                                                                |                                                                                     |

| Intersection Summary                                            |                        |
|-----------------------------------------------------------------|------------------------|
| Area Type:                                                      | Other                  |
| Cycle Length: 91                                                |                        |
| Actuated Cycle Length: 73.4                                     |                        |
| Natural Cycle: 55                                               |                        |
| Control Type: Actuated-Uncoordinated                            |                        |
| Maximum v/c Ratio: 0.80                                         |                        |
| Intersection Signal Delay: 19.4                                 | Intersection LOS: B    |
| Intersection Capacity Utilization 72.7%                         | ICU Level of Service C |
| Analysis Period (min) 15                                        |                        |
| # 95th percentile volume exceeds capacity, queue may be longer. |                        |
| Queue shown is maximum after two cycles.                        |                        |

Splits and Phases: 19: Wells Avenue/JCC Driveway & Nahanton Street



12239.00 :: Needham Street  
20: Highland Avenue & Riverside Street

2025 No Build Conditions  
Timing Plan: Saturday MIDDAY

| Intersection             |        |      |        |       |        |      |
|--------------------------|--------|------|--------|-------|--------|------|
| Int Delay, s/veh         | 0.3    |      |        |       |        |      |
| Movement                 | NWL    | NWR  | NET    | NER   | SWL    | SWT  |
| Lane Configurations      | ↔      |      | ↔↔     |       |        | ↔    |
| Traffic Vol, veh/h       | 5      | 10   | 880    | 2     | 5      | 1040 |
| Future Vol, veh/h        | 5      | 10   | 880    | 2     | 5      | 1040 |
| Conflicting Peds, #/hr   | 0      | 0    | 0      | 5     | 5      | 0    |
| Sign Control             | Stop   | Stop | Free   | Free  | Free   | Free |
| RT Channelized           | -      | None | -      | None  | -      | None |
| Storage Length           | 0      | -    | -      | -     | -      | -    |
| Veh in Median Storage, # | 0      | -    | 0      | -     | -      | 0    |
| Grade, %                 | 0      | -    | 0      | -     | -      | 0    |
| Peak Hour Factor         | 92     | 92   | 92     | 92    | 92     | 92   |
| Heavy Vehicles, %        | 0      | 0    | 0      | 0     | 0      | 0    |
| Mvmt Flow                | 5      | 11   | 957    | 2     | 5      | 1130 |
| Major/Minor              |        |      |        |       |        |      |
|                          | Minor1 |      | Major1 |       | Major2 |      |
| Conflicting Flow All     | 2104   | 484  | 0      | 0     | 964    | 0    |
| Stage 1                  | 963    | -    | -      | -     | -      | -    |
| Stage 2                  | 1141   | -    | -      | -     | -      | -    |
| Critical Hdwy            | 6.6    | 6.9  | -      | -     | 4.1    | -    |
| Critical Hdwy Stg 1      | 5.8    | -    | -      | -     | -      | -    |
| Critical Hdwy Stg 2      | 5.4    | -    | -      | -     | -      | -    |
| Follow-up Hdwy           | 3.5    | 3.3  | -      | -     | 2.2    | -    |
| Pot Cap-1 Maneuver       | 51     | 534  | -      | -     | 722    | -    |
| Stage 1                  | 336    | -    | -      | -     | -      | -    |
| Stage 2                  | 307    | -    | -      | -     | -      | -    |
| Platoon blocked, %       |        | -    | -      | -     | -      | -    |
| Mov Cap-1 Maneuver       | 50     | 532  | -      | -     | 722    | -    |
| Mov Cap-2 Maneuver       | 50     | -    | -      | -     | -      | -    |
| Stage 1                  | 335    | -    | -      | -     | -      | -    |
| Stage 2                  | 301    | -    | -      | -     | -      | -    |
| Approach                 |        |      |        |       |        |      |
|                          | NW     |      | NE     |       | SW     |      |
| HCM Control Delay, s     | 37.8   |      | 0      |       | 0      |      |
| HCM LOS                  | E      |      |        |       |        |      |
| Minor Lane/Major Mvmt    |        |      |        |       |        |      |
|                          | NET    | NER  | NWLn1  | SWL   | SWT    |      |
| Capacity (veh/h)         | -      | -    | 126    | 722   | -      |      |
| HCM Lane V/C Ratio       | -      | -    | 0.129  | 0.008 | -      |      |
| HCM Control Delay (s)    | -      | -    | 37.8   | 10    | 0      |      |
| HCM Lane LOS             | -      | -    | E      | B     | A      |      |
| HCM 95th %tile Q(veh)    | -      | -    | 0.4    | 0     | -      |      |

12239.00 :: Needham Street  
21: Highland Avenue & Highland Terrace/Highland Circle

2025 No Build Conditions  
Timing Plan: Saturday MIDDAY

| Intersection             |        |      |        |       |       |        |      |        |      |      |      |      |
|--------------------------|--------|------|--------|-------|-------|--------|------|--------|------|------|------|------|
| Int Delay, s/veh         | 0.7    |      |        |       |       |        |      |        |      |      |      |      |
| Movement                 | SEL    | SET  | SER    | NWL   | NWT   | NWR    | NEL  | NET    | NER  | SWL  | SWT  | SWR  |
| Lane Configurations      |        | ↔    |        |       | ↔     |        |      | ↔      |      |      | ↔    |      |
| Traffic Vol, veh/h       | 5      | 0    | 10     | 10    | 0     | 5      | 10   | 870    | 10   | 2    | 1040 | 2    |
| Future Vol, veh/h        | 5      | 0    | 10     | 10    | 0     | 5      | 10   | 870    | 10   | 2    | 1040 | 2    |
| Conflicting Peds, #/hr   | 0      | 0    | 0      | 0     | 0     | 0      | 1    | 0      | 6    | 6    | 0    | 1    |
| Sign Control             | Stop   | Stop | Stop   | Stop  | Stop  | Stop   | Free | Free   | Free | Free | Free | Free |
| RT Channelized           | -      | -    | None   | -     | -     | None   | -    | -      | None | -    | -    | None |
| Storage Length           | -      | -    | -      | -     | -     | -      | -    | -      | -    | -    | -    | -    |
| Veh in Median Storage, # | -      | 0    | -      | -     | 0     | -      | -    | 0      | -    | -    | 0    | -    |
| Grade, %                 | -      | 0    | -      | -     | 0     | -      | -    | 0      | -    | -    | 0    | -    |
| Peak Hour Factor         | 92     | 92   | 92     | 92    | 92    | 92     | 92   | 92     | 92   | 92   | 92   | 92   |
| Heavy Vehicles, %        | 0      | 0    | 0      | 0     | 0     | 0      | 1    | 1      | 1    | 0    | 0    | 0    |
| Mvmt Flow                | 5      | 0    | 11     | 11    | 0     | 5      | 11   | 946    | 11   | 2    | 1130 | 2    |
| Major/Minor              |        |      |        |       |       |        |      |        |      |      |      |      |
|                          | Minor2 |      | Minor1 |       |       | Major1 |      | Major2 |      |      |      |      |
| Conflicting Flow All     | 1632   | 2121 | 567    | 1549  | 2117  | 484    | 1134 | 0      | 0    | 963  | 0    | 0    |
| Stage 1                  | 1137   | 1137 | -      | 979   | 979   | -      | -    | -      | -    | -    | -    | -    |
| Stage 2                  | 495    | 984  | -      | 570   | 1138  | -      | -    | -      | -    | -    | -    | -    |
| Critical Hdwy            | 7.5    | 6.5  | 6.9    | 7.5   | 6.5   | 6.9    | 4.12 | -      | -    | 4.1  | -    | -    |
| Critical Hdwy Stg 1      | 6.5    | 5.5  | -      | 6.5   | 5.5   | -      | -    | -      | -    | -    | -    | -    |
| Critical Hdwy Stg 2      | 6.5    | 5.5  | -      | 6.5   | 5.5   | -      | -    | -      | -    | -    | -    | -    |
| Follow-up Hdwy           | 3.5    | 4    | 3.3    | 3.5   | 4     | 3.3    | 2.21 | -      | -    | 2.2  | -    | -    |
| Pot Cap-1 Maneuver       | 68     | 51   | 472    | 79    | 51    | 534    | 618  | -      | -    | 723  | -    | -    |
| Stage 1                  | 218    | 279  | -      | 272   | 331   | -      | -    | -      | -    | -    | -    | -    |
| Stage 2                  | 530    | 329  | -      | 479   | 279   | -      | -    | -      | -    | -    | -    | -    |
| Platoon blocked, %       |        |      |        |       |       |        | -    | -      | -    | -    | -    | -    |
| Mov Cap-1 Maneuver       | 65     | 48   | 472    | 74    | 48    | 531    | 618  | -      | -    | 723  | -    | -    |
| Mov Cap-2 Maneuver       | 65     | 48   | -      | 74    | 48    | -      | -    | -      | -    | -    | -    | -    |
| Stage 1                  | 210    | 277  | -      | 260   | 317   | -      | -    | -      | -    | -    | -    | -    |
| Stage 2                  | 505    | 315  | -      | 465   | 277   | -      | -    | -      | -    | -    | -    | -    |
| Approach                 |        |      |        |       |       |        |      |        |      |      |      |      |
|                          | SE     |      | NW     |       |       | NE     |      | SW     |      |      |      |      |
| HCM Control Delay, s     | 31.3   |      | 45.9   |       |       | 0.3    |      | 0      |      |      |      |      |
| HCM LOS                  | D      |      | E      |       |       |        |      |        |      |      |      |      |
| Minor Lane/Major Mvmt    |        |      |        |       |       |        |      |        |      |      |      |      |
|                          | NEL    | NET  | NER    | NWLn1 | SELn1 | SWL    | SWT  | SWR    |      |      |      |      |
| Capacity (veh/h)         | 618    | -    | -      | 104   | 153   | 723    | -    | -      |      |      |      |      |
| HCM Lane V/C Ratio       | 0.018  | -    | -      | 0.157 | 0.107 | 0.003  | -    | -      |      |      |      |      |
| HCM Control Delay (s)    | 10.9   | 0.2  | -      | 45.9  | 31.3  | 10     | 0    | -      |      |      |      |      |
| HCM Lane LOS             | B      | A    | -      | E     | D     | A      | A    | -      |      |      |      |      |
| HCM 95th %tile Q(veh)    | 0.1    | -    | -      | 0.5   | 0.4   | 0      | -    | -      |      |      |      |      |

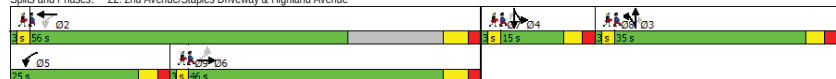
12239.00 :: Needham Street  
22: 2nd Avenue/Staples Driveway & Highland Avenue

2025 No Build Conditions  
Timing Plan: Saturday Midday

| Lane Group              | EBL   | EBT   | EBR  | WBL   | WBT   | WBR  | NBL   | NBT   | NBR   | SBL   | SBT   | SBR   | Ø1   | Ø7   | Ø8   | Ø9   |
|-------------------------|-------|-------|------|-------|-------|------|-------|-------|-------|-------|-------|-------|------|------|------|------|
| Lane Configurations     | ↰     | ↱     | ↱    | ↰     | ↰     | ↰    | ↰     | ↱     | ↱     | ↰     | ↱     | ↱     |      |      |      |      |
| Traffic Volume (vph)    | 15    | 645   | 145  | 155   | 870   | 40   | 140   | 15    | 175   | 70    | 10    | 15    |      |      |      |      |
| Future Volume (vph)     | 15    | 645   | 145  | 155   | 870   | 40   | 140   | 15    | 175   | 70    | 10    | 15    |      |      |      |      |
| Ideal Flow (vphpl)      | 1900  | 1900  | 1900 | 1900  | 1900  | 1900 | 1900  | 1900  | 1900  | 1900  | 1900  | 1900  |      |      |      |      |
| Storage Length (ft)     | 100   |       | 0    | 100   | 0     | 150  | 100   | 0     | 100   | 0     | 50    |       |      |      |      |      |
| Storage Lanes           | 1     |       | 0    | 0     | 0     | 1    | 1     |       | 1     | 0     | 1     |       |      |      |      |      |
| Taper Length (ft)       | 25    |       |      | 25    |       | 25   |       |       | 25    |       |       |       |      |      |      |      |
| Satd. Flow (prot)       | 1787  | 3448  | 0    | 0     | 3559  | 0    | 1698  | 1717  | 1599  | 0     | 1820  | 1615  |      |      |      |      |
| Flt Permitted           | 0.189 |       |      |       | 0.644 |      | 0.950 | 0.961 |       |       | 0.958 |       |      |      |      |      |
| Satd. Flow (perm)       | 355   | 3448  | 0    | 0     | 2308  | 0    | 1698  | 1717  | 1573  | 0     | 1814  | 1591  |      |      |      |      |
| Right Turn on Red       |       |       | Yes  |       |       | Yes  |       | Yes   |       |       | Yes   |       |      |      |      |      |
| Satd. Flow (RTOR)       |       | 21    |      |       | 4     |      |       | 190   |       |       | 176   |       |      |      |      |      |
| Link Speed (mph)        |       | 30    |      |       | 30    |      |       | 30    |       |       | 30    |       |      |      |      |      |
| Link Distance (ft)      |       | 210   |      |       | 361   |      |       | 859   |       |       | 290   |       |      |      |      |      |
| Travel Time (s)         |       | 4.8   |      |       | 8.2   |      |       | 19.5  |       |       | 6.6   |       |      |      |      |      |
| Confl. Peds. (#/hr)     | 3     |       | 8    | 8     |       | 3    |       |       | 2     | 2     |       |       |      |      |      |      |
| Confl. Bikes (#/hr)     |       |       | 1    |       |       | 1    |       |       |       |       | 1     |       |      |      |      |      |
| Peak Hour Factor        | 0.92  | 0.92  | 0.92 | 0.92  | 0.92  | 0.92 | 0.92  | 0.92  | 0.92  | 0.92  | 0.92  | 0.92  |      |      |      |      |
| Heavy Vehicles (%)      | 1%    | 1%    | 1%   | 0%    | 0%    | 0%   | 1%    | 1%    | 1%    | 0%    | 0%    | 0%    |      |      |      |      |
| Shared Lane Traffic (%) |       |       |      |       |       |      | 45%   |       |       |       |       |       |      |      |      |      |
| Lane Group Flow (vph)   | 16    | 859   | 0    | 0     | 1157  | 0    | 84    | 84    | 190   | 0     | 87    | 16    |      |      |      |      |
| Turn Type               | Perm  | NA    |      | pm+pt | NA    |      | Split | NA    | Perm  | Split | NA    | Perm  |      |      |      |      |
| Protected Phases        |       | 6     |      | 5     | 2     |      | 3     | 3     |       | 4     | 4     |       | 1    | 7    | 8    | 9    |
| Permitted Phases        | 6     |       |      | 2     |       |      |       | 3     |       |       | 4     |       |      |      |      |      |
| Detector Phase          | 6     | 6     |      | 5     | 2     |      | 3     | 3     | 3     | 4     | 4     | 4     |      |      |      |      |
| Switch Phase            |       |       |      |       |       |      |       |       |       |       |       |       |      |      |      |      |
| Minimum Initial (s)     | 15.0  | 15.0  |      | 4.0   | 15.0  |      | 10.0  | 10.0  | 10.0  | 4.0   | 4.0   | 4.0   | 1.0  | 1.0  | 1.0  | 1.0  |
| Minimum Split (s)       | 31.0  | 31.0  |      | 9.0   | 23.0  |      | 23.0  | 23.0  | 23.0  | 26.0  | 26.0  | 26.0  | 3.0  | 3.0  | 3.0  | 3.0  |
| Total Split (s)         | 46.0  | 46.0  |      | 25.0  | 56.0  |      | 35.0  | 35.0  | 35.0  | 15.0  | 15.0  | 15.0  | 3.0  | 3.0  | 3.0  | 3.0  |
| Total Split (%)         | 35.4% | 35.4% |      | 19.2% | 43.1% |      | 26.9% | 26.9% | 26.9% | 11.5% | 11.5% | 11.5% | 2%   | 2%   | 2%   | 2%   |
| Yellow Time (s)         | 4.0   | 4.0   |      | 3.0   | 4.0   |      | 3.0   | 3.0   | 3.0   | 3.0   | 3.0   | 3.0   | 2.0  | 2.0  | 2.0  | 2.0  |
| All-Red Time (s)        | 2.0   | 2.0   |      | 2.0   | 2.0   |      | 2.0   | 2.0   | 2.0   | 2.0   | 2.0   | 2.0   | 0.0  | 0.0  | 0.0  | 0.0  |
| Lost Time Adjust (s)    | 0.0   | 0.0   |      |       | 0.0   |      | 0.0   | 0.0   | 0.0   |       | 0.0   | 0.0   |      |      |      |      |
| Total Lost Time (s)     | 6.0   | 6.0   |      |       | 6.0   |      | 5.0   | 5.0   | 5.0   |       | 5.0   | 5.0   |      |      |      |      |
| Lead/Lag                |       |       |      | Lead  | Lag   |      | Lag   | Lag   | Lag   | Lag   | Lag   | Lag   | Lead | Lead | Lead | Lag  |
| Lead-Lag Optimize?      |       |       |      |       |       |      |       |       |       |       |       |       |      |      |      |      |
| Recall Mode             | None  | None  |      | None  | None  |      | None  | None  | None  | None  | None  | None  | None | None | None | None |
| Act Effct Green (s)     | 50.6  | 50.6  |      | 50.6  | 50.6  |      | 11.5  | 11.5  | 11.5  | 8.3   | 8.3   |       |      |      |      |      |
| Actuated g/C Ratio      | 0.60  | 0.60  |      | 0.60  | 0.14  | 0.14 | 0.14  | 0.14  | 0.10  | 0.10  |       |       |      |      |      |      |
| v/c Ratio               | 0.08  | 0.42  |      | 0.84  | 0.37  | 0.36 | 0.51  | 0.49  | 0.05  |       |       |       |      |      |      |      |
| Control Delay           | 11.8  | 11.2  |      | 23.6  | 40.2  | 40.1 | 10.7  | 48.5  | 0.3   |       |       |       |      |      |      |      |
| Queue Delay             | 0.0   | 0.0   |      | 0.0   | 0.0   | 0.0  | 0.0   | 0.0   | 0.0   |       |       |       |      |      |      |      |
| Total Delay             | 11.8  | 11.2  |      | 23.6  | 40.2  | 40.1 | 10.7  | 48.5  | 0.3   |       |       |       |      |      |      |      |
| LOS                     | B     | B     |      | C     | D     | D    | B     | D     | A     |       |       |       |      |      |      |      |
| Approach Delay          |       | 11.3  |      | 23.6  |       |      | 24.5  |       | 41.0  |       |       |       |      |      |      |      |
| Approach LOS            |       | B     |      | C     |       |      | C     |       | D     |       |       |       |      |      |      |      |
| Queue Length 50th (ft)  |       | 3     | 115  |       | 241   |      | 44    | 44    | 0     |       | 44    | 0     |      |      |      |      |
| Queue Length 95th (ft)  |       | 18    | 232  |       | #540  |      | 95    | 95    | 58    |       | 103   | 0     |      |      |      |      |
| Internal Link Dist (ft) |       |       | 130  |       | 281   |      |       | 779   |       |       | 210   |       |      |      |      |      |
| Turn Bay Length (ft)    |       | 100   |      |       |       |      | 150   |       | 100   |       |       | 50    |      |      |      |      |
| Base Capacity (vph)     |       | 211   | 2061 |       | 1826  |      | 606   | 613   | 684   |       | 216   | 344   |      |      |      |      |
| Starvation Cap Reductn  |       | 0     | 0    |       | 0     |      | 0     | 0     | 0     |       | 0     | 0     |      |      |      |      |
| Spillback Cap Reductn   |       | 0     | 0    |       | 0     |      | 0     | 0     | 0     |       | 0     | 0     |      |      |      |      |
| Storage Cap Reductn     |       | 0     | 0    |       | 0     |      | 0     | 0     | 0     |       | 0     | 0     |      |      |      |      |
| Reduced v/c Ratio       |       | 0.08  | 0.42 |       | 0.63  |      | 0.14  | 0.14  | 0.28  |       | 0.40  | 0.05  |      |      |      |      |

| Intersection Summary                                            |                        |
|-----------------------------------------------------------------|------------------------|
| Area Type:                                                      | Other                  |
| Cycle Length:                                                   | 130                    |
| Actuated Cycle Length:                                          | 85                     |
| Natural Cycle:                                                  | 130                    |
| Control Type:                                                   | Actuated-Uncoordinated |
| Maximum v/c Ratio:                                              | 0.84                   |
| Intersection Signal Delay:                                      | 20.1                   |
| Intersection Capacity Utilization:                              | 77.8%                  |
| ICU Level of Service:                                           | D                      |
| Analysis Period (min):                                          | 15                     |
| # 95th percentile volume exceeds capacity, queue may be longer. |                        |
| Queue shown is maximum after two cycles.                        |                        |

Splits and Phases: 22: 2nd Avenue/Staples Driveway & Highland Avenue



12239.00 :: Needham Street  
23: Highland Avenue & Charles Street

2025 No Build Conditions  
Timing Plan: Saturday Midday

| Intersection             |        |        |      |        |       |      |
|--------------------------|--------|--------|------|--------|-------|------|
| Int Delay, s/veh         | 3.9    |        |      |        |       |      |
| Movement                 | EBL    | EBT    | WBT  | WBR    | SBL   | SBR  |
| Lane Configurations      | ↰      | ↕↕     | ↕↕   |        | ↰     |      |
| Traffic Vol, veh/h       | 45     | 770    | 1005 | 20     | 35    | 110  |
| Future Vol, veh/h        | 45     | 770    | 1005 | 20     | 35    | 110  |
| Conflicting Peds, #/hr   | 3      | 0      | 0    | 3      | 0     | 0    |
| Sign Control             | Free   | Free   | Free | Free   | Stop  | Stop |
| RT Channelized           | -      | None   | -    | None   | -     | None |
| Storage Length           | 100    | -      | -    | -      | 0     | -    |
| Veh in Median Storage, # | -      | 0      | 0    | -      | 0     | -    |
| Grade, %                 | -      | 0      | 0    | -      | 0     | -    |
| Peak Hour Factor         | 92     | 92     | 92   | 92     | 92    | 92   |
| Heavy Vehicles, %        | 1      | 1      | 1    | 1      | 0     | 0    |
| Mvmt Flow                | 49     | 837    | 1092 | 22     | 38    | 120  |
| Major/Minor              |        |        |      |        |       |      |
|                          | Major1 | Major2 |      | Minor2 |       |      |
| Conflicting Flow All     | 1117   | 0      | -    | 0      | 1622  | 560  |
| Stage 1                  | -      | -      | -    | -      | 1106  | -    |
| Stage 2                  | -      | -      | -    | -      | 516   | -    |
| Critical Hdwy            | 4.12   | -      | -    | -      | 6.8   | 6.9  |
| Critical Hdwy Stg 1      | -      | -      | -    | -      | 5.8   | -    |
| Critical Hdwy Stg 2      | -      | -      | -    | -      | 5.8   | -    |
| Follow-up Hdwy           | 2.21   | -      | -    | -      | 3.5   | 3.3  |
| Pot Cap-1 Maneuver       | 627    | -      | -    | -      | 95    | 477  |
| Stage 1                  | -      | -      | -    | -      | 283   | -    |
| Stage 2                  | -      | -      | -    | -      | 570   | -    |
| Platoon blocked, %       | -      | -      | -    | -      | -     | -    |
| Mov Cap-1 Maneuver       | 627    | -      | -    | -      | 87    | 476  |
| Mov Cap-2 Maneuver       | -      | -      | -    | -      | 87    | -    |
| Stage 1                  | -      | -      | -    | -      | 282   | -    |
| Stage 2                  | -      | -      | -    | -      | 524   | -    |
| Approach                 |        |        |      |        |       |      |
|                          | EB     | WB     |      | SB     |       |      |
| HCM Control Delay, s     | 0.6    | 0      |      | 49.5   |       |      |
| HCM LOS                  |        |        |      | E      |       |      |
| Minor Lane/Major Mvmt    |        |        |      |        |       |      |
|                          | EBL    | EBT    | WBT  | WBR    | SBLn1 |      |
| Capacity (veh/h)         | 627    | -      | -    | -      | 229   |      |
| HCM Lane V/C Ratio       | 0.078  | -      | -    | -      | 0.688 |      |
| HCM Control Delay (s)    | 11.2   | -      | -    | -      | 49.5  |      |
| HCM Lane LOS             | B      | -      | -    | -      | E     |      |
| HCM 95th %tile Q(veh)    | 0.3    | -      | -    | -      | 4.4   |      |

12239.00 :: Needham Street  
24: Highland Avenue & Wexford Street

2025 No Build Conditions  
Timing Plan: Saturday MIDDAY

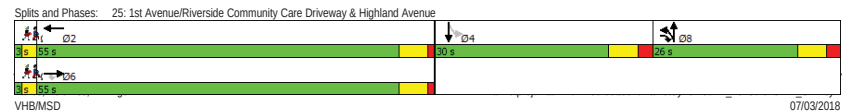
| Intersection             |                                                                                   |                                                                                   |                                                                                   |        |                                                                                   |       |
|--------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|--------|-----------------------------------------------------------------------------------|-------|
| Int Delay, s/veh         | 11.4                                                                              |                                                                                   |                                                                                   |        |                                                                                   |       |
| Movement                 | EBL                                                                               | EBT                                                                               | WBT                                                                               | WBR    | SBL                                                                               | SBR   |
| Lane Configurations      |  |  |  |        |  |       |
| Traffic Vol, veh/h       | 90                                                                                | 775                                                                               | 1080                                                                              | 35     | 40                                                                                | 130   |
| Future Vol, veh/h        | 90                                                                                | 775                                                                               | 1080                                                                              | 35     | 40                                                                                | 130   |
| Conflicting Peds, #/hr   | 2                                                                                 | 0                                                                                 | 0                                                                                 | 2      | 0                                                                                 | 0     |
| Sign Control             | Free                                                                              | Free                                                                              | Free                                                                              | Free   | Stop                                                                              | Stop  |
| RT Channelized           | -                                                                                 | None                                                                              | -                                                                                 | None   | -                                                                                 | None  |
| Storage Length           | 100                                                                               | -                                                                                 | -                                                                                 | -      | 0                                                                                 | -     |
| Veh in Median Storage, # | -                                                                                 | 0                                                                                 | 0                                                                                 | -      | 0                                                                                 | -     |
| Grade, %                 | -                                                                                 | 0                                                                                 | 0                                                                                 | -      | 0                                                                                 | -     |
| Peak Hour Factor         | 92                                                                                | 92                                                                                | 92                                                                                | 92     | 92                                                                                | 92    |
| Heavy Vehicles, %        | 0                                                                                 | 0                                                                                 | 1                                                                                 | 1      | 0                                                                                 | 0     |
| Mvmt Flow                | 98                                                                                | 842                                                                               | 1174                                                                              | 38     | 43                                                                                | 141   |
| Major/Minor              |                                                                                   |                                                                                   |                                                                                   |        |                                                                                   |       |
|                          | Major1                                                                            | Major2                                                                            |                                                                                   | Minor2 |                                                                                   |       |
| Conflicting Flow All     | 1214                                                                              | 0                                                                                 | -                                                                                 | 0      | 1812                                                                              | 608   |
| Stage 1                  | -                                                                                 | -                                                                                 | -                                                                                 | -      | 1195                                                                              | -     |
| Stage 2                  | -                                                                                 | -                                                                                 | -                                                                                 | -      | 617                                                                               | -     |
| Critical Hdwy            | 4.1                                                                               | -                                                                                 | -                                                                                 | -      | 6.8                                                                               | 6.9   |
| Critical Hdwy Stg 1      | -                                                                                 | -                                                                                 | -                                                                                 | -      | 5.8                                                                               | -     |
| Critical Hdwy Stg 2      | -                                                                                 | -                                                                                 | -                                                                                 | -      | 5.8                                                                               | -     |
| Follow-up Hdwy           | 2.2                                                                               | -                                                                                 | -                                                                                 | -      | 3.5                                                                               | 3.3   |
| Pot Cap-1 Maneuver       | 582                                                                               | -                                                                                 | -                                                                                 | -      | 71                                                                                | 444   |
| Stage 1                  | -                                                                                 | -                                                                                 | -                                                                                 | -      | 254                                                                               | -     |
| Stage 2                  | -                                                                                 | -                                                                                 | -                                                                                 | -      | 506                                                                               | -     |
| Platoon blocked, %       | -                                                                                 | -                                                                                 | -                                                                                 | -      | -                                                                                 | -     |
| Mov Cap-1 Maneuver       | 582                                                                               | -                                                                                 | -                                                                                 | -      | 59                                                                                | 443   |
| Mov Cap-2 Maneuver       | -                                                                                 | -                                                                                 | -                                                                                 | -      | 59                                                                                | -     |
| Stage 1                  | -                                                                                 | -                                                                                 | -                                                                                 | -      | 254                                                                               | -     |
| Stage 2                  | -                                                                                 | -                                                                                 | -                                                                                 | -      | 420                                                                               | -     |
| Approach                 |                                                                                   |                                                                                   |                                                                                   |        |                                                                                   |       |
|                          | EB                                                                                | WB                                                                                |                                                                                   | SB     |                                                                                   |       |
| HCM Control Delay, s     | 1.3                                                                               | 0                                                                                 |                                                                                   | 137.8  |                                                                                   |       |
| HCM LOS                  |                                                                                   |                                                                                   |                                                                                   | F      |                                                                                   |       |
| Minor Lane/Major Mvmt    |                                                                                   |                                                                                   |                                                                                   |        |                                                                                   |       |
|                          | EBL                                                                               | EBT                                                                               | WBT                                                                               | WBR    | SBLn1                                                                             |       |
| Capacity (veh/h)         | 582                                                                               | -                                                                                 | -                                                                                 | -      | -                                                                                 | 175   |
| HCM Lane V/C Ratio       | 0.168                                                                             | -                                                                                 | -                                                                                 | -      | -                                                                                 | 1.056 |
| HCM Control Delay (s)    | 12.4                                                                              | -                                                                                 | -                                                                                 | -      | -                                                                                 | 137.8 |
| HCM Lane LOS             | B                                                                                 | -                                                                                 | -                                                                                 | -      | -                                                                                 | F     |
| HCM 95th %tile Q(veh)    | 0.6                                                                               | -                                                                                 | -                                                                                 | -      | -                                                                                 | 9     |

12239.00 :: Needham Street  
25: 1st Avenue/Riverside Community Care Driveway & Highland Avenue

2025 No Build Conditions  
Timing Plan: Saturday MIDDAY

| Lane Group              | EBL   | EBT   | EBR  | WBL   | WBT  | WBR   | NBL   | NBT   | NBR   | SBL   | SBT  | SBR  | Ø1   | Ø5 |
|-------------------------|-------|-------|------|-------|------|-------|-------|-------|-------|-------|------|------|------|----|
| Lane Configurations     | ↰     | ↰↱    | ↰    | ↰     | ↰↱   | ↰     | ↰     | ↰↱    | ↰     | ↰     | ↰↱   | ↰    |      |    |
| Traffic Volume (vph)    | 0     | 770   | 130  | 0     | 1215 | 0     | 195   | 0     | 100   | 0     | 0    | 0    |      |    |
| Future Volume (vph)     | 0     | 770   | 130  | 0     | 1215 | 0     | 195   | 0     | 100   | 0     | 0    | 0    |      |    |
| Ideal Flow (vphpl)      | 1900  | 1900  | 1900 | 1900  | 1900 | 1900  | 1900  | 1900  | 1900  | 1900  | 1900 | 1900 |      |    |
| Storage Length (ft)     | 0     | 0     | 0    | 0     | 0    | 0     | 0     | 0     | 200   | 0     | 0    | 0    |      |    |
| Storage Lanes           | 0     | 1     | 0    | 0     | 0    | 0     | 1     | 0     | 0     | 0     | 0    | 0    |      |    |
| Taper Length (ft)       | 25    |       |      | 25    |      |       | 25    |       |       | 25    |      |      |      |    |
| Satd. Flow (prot)       | 0     | 3610  | 1615 | 0     | 3610 | 0     | 1715  | 1591  | 0     | 0     | 1900 | 0    |      |    |
| Flt Permitted           |       |       |      |       |      |       | 0.950 | 0.986 |       |       |      |      |      |    |
| Satd. Flow (perm)       | 0     | 3610  | 1577 | 0     | 3610 | 0     | 1715  | 1591  | 0     | 0     | 1900 | 0    |      |    |
| Right Turn on Red       |       | Yes   |      |       | Yes  |       |       |       | Yes   |       |      | Yes  |      |    |
| Satd. Flow (RTOR)       |       | 141   |      |       |      |       |       | 96    |       |       |      |      |      |    |
| Link Speed (mph)        | 30    |       |      | 30    |      |       | 30    |       |       |       | 30   |      |      |    |
| Link Distance (ft)      | 377   |       |      | 272   |      |       | 825   |       |       |       | 147  |      |      |    |
| Travel Time (s)         | 8.6   |       |      | 6.2   |      |       | 18.8  |       |       |       | 3.3  |      |      |    |
| Confl. Peds. (#/hr)     |       | 1     | 1    |       |      |       |       |       |       |       |      |      |      |    |
| Confl. Bikes (#/hr)     |       | 1     |      |       |      |       |       |       |       |       |      |      |      |    |
| Peak Hour Factor        | 0.92  | 0.92  | 0.92 | 0.92  | 0.92 | 0.92  | 0.92  | 0.92  | 0.92  | 0.92  | 0.92 | 0.92 |      |    |
| Heavy Vehicles (%)      | 0%    | 0%    | 0%   | 0%    | 0%   | 0%    | 0%    | 0%    | 0%    | 0%    | 0%   | 0%   |      |    |
| Shared Lane Traffic (%) |       |       |      |       |      |       | 21%   |       |       |       |      |      |      |    |
| Lane Group Flow (vph)   | 0     | 837   | 141  | 0     | 1321 | 0     | 167   | 154   | 0     | 0     | 0    | 0    |      |    |
| Turn Type               | NA    | pm+ov |      | NA    |      | Split | NA    |       |       |       |      |      |      |    |
| Protected Phases        | 6     | 8     | 2    |       |      | 8     | 8     |       |       | 4     |      |      | 1    | 5  |
| Permitted Phases        | 6     |       |      |       |      |       |       |       |       | 4     |      |      |      |    |
| Detector Phase          | 6     | 8     |      | 2     |      | 8     | 8     |       |       | 4     | 4    |      |      |    |
| Switch Phase            |       |       |      |       |      |       |       |       |       |       |      |      |      |    |
| Minimum Initial (s)     | 10.0  | 6.0   |      | 10.0  |      | 6.0   | 6.0   |       | 6.0   | 6.0   |      | 1.0  | 1.0  |    |
| Minimum Split (s)       | 25.0  | 12.0  |      | 16.0  |      | 12.0  | 12.0  |       | 29.0  | 29.0  |      | 3.0  | 3.0  |    |
| Total Split (s)         | 55.0  | 26.0  |      | 55.0  |      | 26.0  | 26.0  |       | 30.0  | 30.0  |      | 3.0  | 3.0  |    |
| Total Split (%)         | 48.2% | 22.8% |      | 48.2% |      | 22.8% | 22.8% |       | 26.3% | 26.3% |      | 3%   | 3%   |    |
| Yellow Time (s)         | 4.0   | 4.0   |      | 4.0   |      | 4.0   | 4.0   |       | 4.0   | 4.0   |      | 2.0  | 2.0  |    |
| All-Red Time (s)        | 1.0   | 2.0   |      | 1.0   |      | 2.0   | 2.0   |       | 2.0   | 2.0   |      | 0.0  | 0.0  |    |
| Lost Time Adjust (s)    | 0.0   | 0.0   |      | 0.0   |      | 0.0   | 0.0   |       | 0.0   | 0.0   |      |      |      |    |
| Total Lost Time (s)     | 5.0   | 6.0   |      | 5.0   |      | 6.0   | 6.0   |       | 6.0   | 6.0   |      |      |      |    |
| Lead/Lag                | Lag   |       |      | Lag   |      |       |       |       |       |       |      | Lead | Lead |    |
| Lead-Lag Optimize?      | Yes   |       |      | Yes   |      |       |       |       |       |       |      | Yes  | Yes  |    |
| Recall Mode             | Min   | None  |      | Min   |      | None  | None  |       | None  | None  |      | None | None |    |
| Act Effect Green (s)    | 25.9  | 35.9  |      | 26.3  |      | 11.1  | 11.1  |       |       |       |      |      |      |    |
| Actuated g/C Ratio      | 0.53  | 0.73  |      | 0.54  |      | 0.23  | 0.23  |       |       |       |      |      |      |    |
| v/c Ratio               | 0.44  | 0.12  |      | 0.68  |      | 0.43  | 0.35  |       |       |       |      |      |      |    |
| Control Delay           | 8.2   | 0.4   |      | 10.4  |      | 21.9  | 11.1  |       |       |       |      |      |      |    |
| Queue Delay             | 0.0   | 0.0   |      | 0.0   |      | 0.0   | 0.0   |       |       |       |      |      |      |    |
| Total Delay             | 8.2   | 0.4   |      | 10.4  |      | 21.9  | 11.1  |       |       |       |      |      |      |    |
| LOS                     | A     | A     |      | B     |      | C     | B     |       |       |       |      |      |      |    |
| Approach Delay          | 7.1   |       |      | 10.4  |      |       | 16.7  |       |       |       |      |      |      |    |
| Approach LOS            | A     |       |      | B     |      |       | B     |       |       |       |      |      |      |    |
| Queue Length 50th (ft)  | 64    | 0     |      | 122   |      | 42    | 13    |       |       |       |      |      |      |    |
| Queue Length 95th (ft)  | 137   | 3     |      | 225   |      | 112   | 64    |       |       |       |      |      |      |    |
| Internal Link Dist (ft) | 297   |       |      | 192   |      |       | 745   |       |       | 67    |      |      |      |    |
| Turn Bay Length (ft)    |       |       |      |       |      |       |       |       |       |       |      |      |      |    |
| Base Capacity (vph)     | 3367  | 1382  |      | 3367  |      | 736   | 738   |       |       |       |      |      |      |    |
| Starvation Cap Reductn  | 0     | 0     |      | 0     |      | 0     | 0     |       |       |       |      |      |      |    |
| Spillback Cap Reductn   | 0     | 0     |      | 0     |      | 0     | 0     |       |       |       |      |      |      |    |
| Storage Cap Reductn     | 0     | 0     |      | 0     |      | 0     | 0     |       |       |       |      |      |      |    |
| Reduced v/c Ratio       | 0.25  | 0.10  |      | 0.39  |      | 0.23  | 0.21  |       |       |       |      |      |      |    |

| Intersection Summary                    |                        |
|-----------------------------------------|------------------------|
| Area Type:                              | Other                  |
| Cycle Length: 114                       |                        |
| Actuated Cycle Length: 49               |                        |
| Natural Cycle: 80                       |                        |
| Control Type: Actuated-Uncoordinated    |                        |
| Maximum v/c Ratio: 0.68                 |                        |
| Intersection Signal Delay: 10.0         | Intersection LOS: A    |
| Intersection Capacity Utilization 51.2% | ICU Level of Service A |
| Analysis Period (min) 15                |                        |



12239.00 :: Needham Street  
26: I-95 NB Ramps & Highland Avenue

2025 No Build Conditions  
Timing Plan: Saturday MIDDAY

| Intersection             |        |        |       |        |      |        |      |      |       |      |      |       |
|--------------------------|--------|--------|-------|--------|------|--------|------|------|-------|------|------|-------|
| Int Delay, s/veh         | 1.6    |        |       |        |      |        |      |      |       |      |      |       |
| Movement                 | EBL    | EBT    | EBR   | WBL    | WBT  | WBR    | NBL  | NBT  | NBR   | SBL  | SBT  | SBR   |
| Lane Configurations      |        | ↕↕     | ↗     |        | ↕↕   |        |      |      | ↗     |      |      | ↗     |
| Traffic Vol, veh/h       | 0      | 670    | 395   | 0      | 915  | 495    | 0    | 0    | 230   | 0    | 0    | 85    |
| Future Vol, veh/h        | 0      | 670    | 395   | 0      | 915  | 495    | 0    | 0    | 230   | 0    | 0    | 85    |
| Conflicting Peds, #/hr   | 0      | 0      | 2     | 2      | 0    | 0      | 0    | 0    | 2     | 0    | 0    | 0     |
| Sign Control             | Free   | Free   | Free  | Free   | Free | Free   | Stop | Stop | Stop  | Stop | Stop | Stop  |
| RT Channelized           | -      | -      | Yield | -      | -    | Yield  | -    | -    | Yield | -    | -    | Yield |
| Storage Length           | -      | -      | 0     | -      | -    | -      | -    | -    | 0     | -    | -    | 0     |
| Veh in Median Storage, # | -      | 0      | -     | -      | 0    | -      | -    | 0    | -     | -    | 0    | -     |
| Grade, %                 | -      | 0      | -     | -      | 0    | -      | -    | 0    | -     | -    | 0    | -     |
| Peak Hour Factor         | 92     | 92     | 92    | 92     | 92   | 92     | 92   | 92   | 92    | 92   | 92   | 92    |
| Heavy Vehicles, %        | 0      | 0      | 0     | 1      | 1    | 1      | 1    | 1    | 1     | 0    | 0    | 0     |
| Mvmt Flow                | 0      | 728    | 429   | 0      | 995  | 538    | 0    | 0    | 250   | 0    | 0    | 92    |
| Major/Minor              | Major1 | Major2 |       | Minor1 |      | Minor2 |      |      |       |      |      |       |
| Conflicting Flow All     | -      | 0      | 0     | -      | 0    | -      | 368  | -    | -     | 497  |      |       |
| Stage 1                  | -      | -      | -     | -      | -    | -      | -    | -    | -     | -    |      |       |
| Stage 2                  | -      | -      | -     | -      | -    | -      | -    | -    | -     | -    |      |       |
| Critical Hdwy            | -      | -      | -     | -      | -    | -      | -    | 6.92 | -     | 6.9  |      |       |
| Critical Hdwy Stg 1      | -      | -      | -     | -      | -    | -      | -    | -    | -     | -    |      |       |
| Critical Hdwy Stg 2      | -      | -      | -     | -      | -    | -      | -    | -    | -     | -    |      |       |
| Follow-up Hdwy           | -      | -      | -     | -      | -    | -      | 3.31 | -    | -     | 3.3  |      |       |
| Pot Cap-1 Maneuver       | 0      | -      | 0     | -      | 0    | 0      | 632  | 0    | 0     | 524  |      |       |
| Stage 1                  | 0      | -      | 0     | -      | 0    | 0      | -    | 0    | 0     | -    |      |       |
| Stage 2                  | 0      | -      | 0     | -      | 0    | 0      | -    | 0    | 0     | -    |      |       |
| Platoon blocked, %       | -      | -      | -     | -      | -    | -      | -    | -    | -     | -    |      |       |
| Mov Cap-1 Maneuver       | -      | -      | -     | -      | -    | -      | 630  | -    | -     | 524  |      |       |
| Mov Cap-2 Maneuver       | -      | -      | -     | -      | -    | -      | -    | -    | -     | -    |      |       |
| Stage 1                  | -      | -      | -     | -      | -    | -      | -    | -    | -     | -    |      |       |
| Stage 2                  | -      | -      | -     | -      | -    | -      | -    | -    | -     | -    |      |       |
| Approach                 | EB     | WB     |       | NB     |      | SB     |      |      |       |      |      |       |
| HCM Control Delay, s     | 0      | 0      |       | 14.4   |      | 13.3   |      |      |       |      |      |       |
| HCM LOS                  |        |        |       | B      |      | B      |      |      |       |      |      |       |
| Minor Lane/Major Mvmt    | NBLn1  | EBT    | EBR   | WBT    | WBR  | SBLn1  |      |      |       |      |      |       |
| Capacity (veh/h)         | 630    | -      | -     | -      | -    | 524    |      |      |       |      |      |       |
| HCM Lane V/C Ratio       | 0.397  | -      | -     | -      | -    | 0.176  |      |      |       |      |      |       |
| HCM Control Delay (s)    | 14.4   | -      | -     | -      | -    | 13.3   |      |      |       |      |      |       |
| HCM Lane LOS             | B      | -      | -     | -      | -    | B      |      |      |       |      |      |       |
| HCM 95th %tile Q(veh)    | 1.9    | -      | -     | -      | -    | 0.6    |      |      |       |      |      |       |

12239.00 :: Needham Street  
27: I-95 SB Ramps & Highland Avenue

2025 No Build Conditions  
Timing Plan: Saturday MIDDAY

| Intersection             |        |        |       |        |      |        |      |      |       |      |      |       |
|--------------------------|--------|--------|-------|--------|------|--------|------|------|-------|------|------|-------|
| Int Delay, s/veh         | 7.1    |        |       |        |      |        |      |      |       |      |      |       |
| Movement                 | EBL    | EBT    | EBR   | WBL    | WBT  | WBR    | NBL  | NBT  | NBR   | SBL  | SBT  | SBR   |
| Lane Configurations      |        | ↕↕     |       |        | ↕↕   | ↗      |      |      | ↗     |      |      | ↗     |
| Traffic Vol, veh/h       | 0      | 715    | 155   | 0      | 710  | 290    | 0    | 0    | 350   | 0    | 0    | 435   |
| Future Vol, veh/h        | 0      | 715    | 155   | 0      | 710  | 290    | 0    | 0    | 350   | 0    | 0    | 435   |
| Conflicting Peds, #/hr   | 0      | 0      | 2     | 2      | 0    | 0      | 0    | 0    | 2     | 0    | 0    | 0     |
| Sign Control             | Free   | Free   | Free  | Free   | Free | Free   | Stop | Stop | Stop  | Stop | Stop | Stop  |
| RT Channelized           | -      | -      | Yield | -      | -    | Yield  | -    | -    | Yield | -    | -    | Yield |
| Storage Length           | -      | -      | -     | -      | -    | 0      | -    | -    | 0     | -    | -    | 0     |
| Veh in Median Storage, # | -      | 0      | -     | -      | 0    | -      | -    | 0    | -     | -    | 0    | -     |
| Grade, %                 | -      | 0      | -     | -      | 0    | -      | -    | 0    | -     | -    | 0    | -     |
| Peak Hour Factor         | 92     | 92     | 92    | 92     | 92   | 92     | 92   | 92   | 92    | 92   | 92   | 92    |
| Heavy Vehicles, %        | 0      | 0      | 0     | 1      | 1    | 1      | 1    | 1    | 1     | 0    | 0    | 0     |
| Mvmt Flow                | 0      | 777    | 168   | 0      | 772  | 315    | 0    | 0    | 380   | 0    | 0    | 473   |
| Major/Minor              | Major1 | Major2 |       | Minor1 |      | Minor2 |      |      |       |      |      |       |
| Conflicting Flow All     | -      | 0      | 0     | -      | 0    | -      | -    | 393  | -     | -    | 386  |       |
| Stage 1                  | -      | -      | -     | -      | -    | -      | -    | -    | -     | -    | -    |       |
| Stage 2                  | -      | -      | -     | -      | -    | -      | -    | -    | -     | -    | -    |       |
| Critical Hdwy            | -      | -      | -     | -      | -    | -      | -    | -    | 6.92  | -    | 6.9  |       |
| Critical Hdwy Stg 1      | -      | -      | -     | -      | -    | -      | -    | -    | -     | -    | -    |       |
| Critical Hdwy Stg 2      | -      | -      | -     | -      | -    | -      | -    | -    | -     | -    | -    |       |
| Follow-up Hdwy           | -      | -      | -     | -      | -    | -      | -    | 3.31 | -     | -    | 3.3  |       |
| Pot Cap-1 Maneuver       | 0      | -      | -     | 0      | -    | -      | 0    | 0    | 609   | 0    | 0    | 618   |
| Stage 1                  | 0      | -      | -     | 0      | -    | -      | 0    | 0    | -     | 0    | 0    | -     |
| Stage 2                  | 0      | -      | -     | 0      | -    | -      | 0    | 0    | -     | 0    | 0    | -     |
| Platoon blocked, %       | -      | -      | -     | -      | -    | -      | -    | -    | -     | -    | -    |       |
| Mov Cap-1 Maneuver       | -      | -      | -     | -      | -    | -      | -    | -    | 607   | -    | -    | 618   |
| Mov Cap-2 Maneuver       | -      | -      | -     | -      | -    | -      | -    | -    | -     | -    | -    |       |
| Stage 1                  | -      | -      | -     | -      | -    | -      | -    | -    | -     | -    | -    |       |
| Stage 2                  | -      | -      | -     | -      | -    | -      | -    | -    | -     | -    | -    |       |
| Approach                 | EB     | WB     |       | NB     |      | SB     |      |      |       |      |      |       |
| HCM Control Delay, s     | 0      | 0      |       | 20.4   |      | 27.2   |      |      |       |      |      |       |
| HCM LOS                  |        |        |       | C      |      | D      |      |      |       |      |      |       |
| Minor Lane/Major Mvmt    | NBLn1  | EBT    | EBR   | WBT    | WBR  | SBLn1  |      |      |       |      |      |       |
| Capacity (veh/h)         | 607    | -      | -     | -      | -    | 618    |      |      |       |      |      |       |
| HCM Lane V/C Ratio       | 0.627  | -      | -     | -      | -    | 0.765  |      |      |       |      |      |       |
| HCM Control Delay (s)    | 20.4   | -      | -     | -      | -    | 27.2   |      |      |       |      |      |       |
| HCM Lane LOS             | C      | -      | -     | -      | -    | D      |      |      |       |      |      |       |
| HCM 95th %ile Q(veh)     | 4.4    | -      | -     | -      | -    | 7      |      |      |       |      |      |       |

12239.00 :: Needham Street  
1: Chestnut Street & Route 9 WB Access Road

2025 Build Conditions - without Shuttle Service  
Timing Plan: Weekday Morning

| Intersection               |      |      |      |      |      |      |       |      |      |      |      |      |  |
|----------------------------|------|------|------|------|------|------|-------|------|------|------|------|------|--|
| Intersection Delay, s/veh  | 94.4 |      |      |      |      |      |       |      |      |      |      |      |  |
| Intersection LOS           | F    |      |      |      |      |      |       |      |      |      |      |      |  |
| Movement                   | EBL  | EBT  | EBR  | WBL  | WBT  | WBR  | NBL   | NBT  | NBR  | SBL  | SBT  | SBR  |  |
| Lane Configurations        |      | ↔    |      |      | ↔    |      |       | ↔    |      |      | ↔    |      |  |
| Traffic Vol, veh/h         | 30   | 1    | 10   | 50   | 105  | 35   | 70    | 620  | 1    | 0    | 360  | 265  |  |
| Future Vol, veh/h          | 30   | 1    | 10   | 50   | 105  | 35   | 70    | 620  | 1    | 0    | 360  | 265  |  |
| Peak Hour Factor           | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92  | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |  |
| Heavy Vehicles, %          | 0    | 0    | 0    | 0    | 0    | 0    | 0     | 0    | 0    | 0    | 0    | 0    |  |
| Mvmt Flow                  | 33   | 1    | 11   | 54   | 114  | 38   | 76    | 674  | 1    | 0    | 391  | 288  |  |
| Number of Lanes            | 0    | 1    | 0    | 0    | 1    | 0    | 0     | 1    | 0    | 0    | 1    | 0    |  |
| Approach                   | EB   |      |      | WB   |      |      | NB    |      |      | SB   |      |      |  |
| Opposing Approach          | WB   |      |      | EB   |      |      | SB    |      |      | NB   |      |      |  |
| Opposing Lanes             | 1    |      |      | 1    |      |      | 1     |      |      | 1    |      |      |  |
| Conflicting Approach Left  | SB   |      |      | NB   |      |      | EB    |      |      | WB   |      |      |  |
| Conflicting Lanes Left     | 1    |      |      | 1    |      |      | 1     |      |      | 1    |      |      |  |
| Conflicting Approach Right | NB   |      |      | SB   |      |      | WB    |      |      | EB   |      |      |  |
| Conflicting Lanes Right    | 1    |      |      | 1    |      |      | 1     |      |      | 1    |      |      |  |
| HCM Control Delay          | 12.7 |      |      | 16   |      |      | 136.9 |      |      | 76.5 |      |      |  |
| HCM LOS                    | B    |      |      | C    |      |      | F     |      |      | F    |      |      |  |

| Lane                   | NBLn1 | EBLn1 | WBLn1 | SBLn1 |  |
|------------------------|-------|-------|-------|-------|--|
| Vol Left, %            | 10%   | 73%   | 26%   | 0%    |  |
| Vol Thru, %            | 90%   | 2%    | 55%   | 58%   |  |
| Vol Right, %           | 0%    | 24%   | 18%   | 42%   |  |
| Sign Control           | Stop  | Stop  | Stop  | Stop  |  |
| Traffic Vol by Lane    | 691   | 41    | 190   | 625   |  |
| LT Vol                 | 70    | 30    | 50    | 0     |  |
| Through Vol            | 620   | 1     | 105   | 360   |  |
| RT Vol                 | 1     | 10    | 35    | 265   |  |
| Lane Flow Rate         | 751   | 45    | 207   | 679   |  |
| Geometry Grp           | 1     | 1     | 1     | 1     |  |
| Degree of Util (X)     | 1.226 | 0.1   | 0.412 | 1.057 |  |
| Departure Headway (Hd) | 6.053 | 8.744 | 7.727 | 5.958 |  |
| Convergence, Y/N       | Yes   | Yes   | Yes   | Yes   |  |
| Cap                    | 608   | 412   | 469   | 611   |  |
| Service Time           | 4.053 | 6.744 | 5.727 | 3.958 |  |
| HCM Lane V/C Ratio     | 1.235 | 0.109 | 0.441 | 1.111 |  |
| HCM Control Delay      | 136.9 | 12.7  | 16    | 76.5  |  |
| HCM Lane LOS           | F     | B     | C     | F     |  |
| HCM 95th-tile Q        | 26.9  | 0.3   | 2     | 17.8  |  |

12239.00 :: Needham Street  
2: Chestnut Street & Route 9 EB Access Road

2025 Build Conditions - without Shuttle Service  
Timing Plan: Weekday Morning

| Intersection               |      |      |      |      |      |      |      |      |      |      |      |      |  |
|----------------------------|------|------|------|------|------|------|------|------|------|------|------|------|--|
| Intersection Delay, s/veh  | 31.5 |      |      |      |      |      |      |      |      |      |      |      |  |
| Intersection LOS           | D    |      |      |      |      |      |      |      |      |      |      |      |  |
| Movement                   | EBL  | EBT  | EBR  | WBL  | WBT  | WBR  | NBL  | NBT  | NBR  | SBL  | SBT  | SBR  |  |
| Lane Configurations        |      | ↔    |      |      | ↔    |      |      | ↔    |      |      | ↔    |      |  |
| Traffic Vol, veh/h         | 255  | 50   | 20   | 0    | 5    | 40   | 2    | 395  | 60   | 70   | 350  | 2    |  |
| Future Vol, veh/h          | 255  | 50   | 20   | 0    | 5    | 40   | 2    | 395  | 60   | 70   | 350  | 2    |  |
| Peak Hour Factor           | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |  |
| Heavy Vehicles, %          | 0    | 0    | 0    | 0    | 0    | 0    | 1    | 1    | 1    | 0    | 0    | 0    |  |
| Mvmt Flow                  | 277  | 54   | 22   | 0    | 5    | 43   | 2    | 429  | 65   | 76   | 380  | 2    |  |
| Number of Lanes            | 0    | 1    | 0    | 0    | 1    | 0    | 0    | 1    | 0    | 0    | 1    | 0    |  |
| Approach                   | EB   |      |      | WB   |      |      | NB   |      |      | SB   |      |      |  |
| Opposing Approach          | WB   |      |      | EB   |      |      | SB   |      |      | NB   |      |      |  |
| Opposing Lanes             | 1    |      |      | 1    |      |      | 1    |      |      | 1    |      |      |  |
| Conflicting Approach Left  | SB   |      |      | NB   |      |      | EB   |      |      | WB   |      |      |  |
| Conflicting Lanes Left     | 1    |      |      | 1    |      |      | 1    |      |      | 1    |      |      |  |
| Conflicting Approach Right | NB   |      |      | SB   |      |      | WB   |      |      | EB   |      |      |  |
| Conflicting Lanes Right    | 1    |      |      | 1    |      |      | 1    |      |      | 1    |      |      |  |
| HCM Control Delay          | 24.2 |      |      | 11.6 |      |      | 37.6 |      |      | 32.6 |      |      |  |
| HCM LOS                    | C    |      |      | B    |      |      | E    |      |      | D    |      |      |  |

| Lane                   | NBLn1 | EBLn1 | WBLn1 | SBLn1 |  |
|------------------------|-------|-------|-------|-------|--|
| Vol Left, %            | 0%    | 78%   | 0%    | 17%   |  |
| Vol Thru, %            | 86%   | 15%   | 11%   | 83%   |  |
| Vol Right, %           | 13%   | 6%    | 89%   | 0%    |  |
| Sign Control           | Stop  | Stop  | Stop  | Stop  |  |
| Traffic Vol by Lane    | 457   | 325   | 45    | 422   |  |
| LT Vol                 | 2     | 255   | 0     | 70    |  |
| Through Vol            | 395   | 50    | 5     | 350   |  |
| RT Vol                 | 60    | 20    | 40    | 2     |  |
| Lane Flow Rate         | 497   | 353   | 49    | 459   |  |
| Geometry Grp           | 1     | 1     | 1     | 1     |  |
| Degree of Util (X)     | 0.867 | 0.687 | 0.105 | 0.82  |  |
| Departure Headway (Hd) | 6.284 | 6.996 | 7.707 | 6.433 |  |
| Convergence, Y/N       | Yes   | Yes   | Yes   | Yes   |  |
| Cap                    | 571   | 516   | 468   | 560   |  |
| Service Time           | 4.363 | 5.076 | 5.707 | 4.516 |  |
| HCM Lane V/C Ratio     | 0.87  | 0.684 | 0.105 | 0.82  |  |
| HCM Control Delay      | 37.6  | 24.2  | 11.6  | 32.6  |  |
| HCM Lane LOS           | E     | C     | B     | D     |  |
| HCM 95th-tile Q        | 9.7   | 5.2   | 0.3   | 8.2   |  |

12239.00 :: Needham Street  
3: Chestnut Street & Elliot Street

2025 Build Conditions - without Shuttle Service  
Timing Plan: Weekday Morning

| Lane Group              | EBL   | EBT   | EBR  | WBL   | WBT   | WBR  | NBL   | NBT   | NBR  | SBL   | SBT   | SBR  | Ø3   |
|-------------------------|-------|-------|------|-------|-------|------|-------|-------|------|-------|-------|------|------|
| Lane Configurations     |       | ↔     |      | ↔     | ↔     |      |       | ↔     |      | ↔     | ↔     |      |      |
| Traffic Volume (vph)    | 370   | 270   | 40   | 5     | 55    | 35   | 40    | 205   | 5    | 30    | 285   | 170  |      |
| Future Volume (vph)     | 370   | 270   | 40   | 5     | 55    | 35   | 40    | 205   | 5    | 30    | 285   | 170  |      |
| Ideal Flow (vphpl)      | 1900  | 1900  | 1900 | 1900  | 1900  | 1900 | 1900  | 1900  | 1900 | 1900  | 1900  | 1900 |      |
| Satd. Flow (prot)       | 0     | 1832  | 0    | 0     | 1801  | 0    | 0     | 1843  | 0    | 0     | 1792  | 0    |      |
| Fit Permitted           |       | 0.774 |      |       | 0.971 |      |       | 0.838 |      |       | 0.966 |      |      |
| Satd. Flow (perm)       | 0     | 1457  | 0    | 0     | 1753  | 0    | 0     | 1553  | 0    | 0     | 1736  | 0    |      |
| Right Turn on Red       |       |       | Yes  |       |       | Yes  |       |       | Yes  |       |       | Yes  |      |
| Satd. Flow (RTOR)       |       | 4     |      |       | 36    |      |       | 1     |      |       | 33    |      |      |
| Link Speed (mph)        |       | 30    |      |       | 30    |      |       | 30    |      |       | 30    |      |      |
| Link Distance (ft)      |       | 764   |      |       | 972   |      |       | 2055  |      |       | 1553  |      |      |
| Travel Time (s)         |       | 17.4  |      |       | 22.1  |      |       | 46.7  |      |       | 35.3  |      |      |
| Confl. Peds. (#/hr)     |       |       | 1    | 1     |       |      | 1     |       | 1    | 1     |       | 1    |      |
| Peak Hour Factor        | 0.92  | 0.92  | 0.92 | 0.92  | 0.92  | 0.92 | 0.92  | 0.92  | 0.92 | 0.92  | 0.92  | 0.92 |      |
| Heavy Vehicles (%)      | 0%    | 0%    | 0%   | 0%    | 0%    | 0%   | 2%    | 2%    | 2%   | 0%    | 0%    | 0%   |      |
| Shared Lane Traffic (%) |       |       |      |       |       |      |       |       |      |       |       |      |      |
| Lane Group Flow (vph)   | 0     | 738   | 0    | 0     | 103   | 0    | 0     | 271   | 0    | 0     | 528   | 0    |      |
| Turn Type               | Perm  | NA    |      | Perm  | NA    |      | Perm  | NA    |      | Perm  | NA    |      |      |
| Protected Phases        |       | 1     |      |       | 1     |      |       | 2     |      |       | 2     |      | 3    |
| Permitted Phases        | 1     |       |      | 1     |       |      | 2     |       |      | 2     |       |      |      |
| Detector Phase          | 1     | 1     |      | 1     | 1     |      | 2     | 2     |      | 2     | 2     |      |      |
| Switch Phase            |       |       |      |       |       |      |       |       |      |       |       |      |      |
| Minimum Initial (s)     | 6.0   | 6.0   |      | 6.0   | 6.0   |      | 6.0   | 6.0   |      | 6.0   | 6.0   |      | 4.0  |
| Minimum Split (s)       | 11.0  | 11.0  |      | 11.0  | 11.0  |      | 11.0  | 11.0  |      | 11.0  | 11.0  |      | 19.0 |
| Total Split (s)         | 35.0  | 35.0  |      | 35.0  | 35.0  |      | 35.0  | 35.0  |      | 35.0  | 35.0  |      | 19.0 |
| Total Split (%)         | 39.3% | 39.3% |      | 39.3% | 39.3% |      | 39.3% | 39.3% |      | 39.3% | 39.3% |      | 21%  |
| Yellow Time (s)         | 3.0   | 3.0   |      | 3.0   | 3.0   |      | 3.0   | 3.0   |      | 3.0   | 3.0   |      | 3.0  |
| All-Red Time (s)        | 2.0   | 2.0   |      | 2.0   | 2.0   |      | 2.0   | 2.0   |      | 2.0   | 2.0   |      | 1.0  |
| Lost Time Adjust (s)    |       | 0.0   |      |       | 0.0   |      |       | 0.0   |      |       | 0.0   |      |      |
| Total Lost Time (s)     |       | 5.0   |      |       | 5.0   |      |       | 5.0   |      |       | 5.0   |      |      |
| Lead/Lag                | Lead  | Lead  |      | Lead  | Lead  |      | Lag   | Lag   |      | Lag   | Lag   |      |      |
| Lead-Lag Optimize?      |       |       |      |       |       |      |       |       |      |       |       |      |      |
| Recall Mode             | None  | None  |      | None  | None  |      | None  | None  |      | None  | None  |      | None |
| Act Effct Green (s)     | 30.7  | 30.7  |      | 30.7  | 30.7  |      | 30.7  | 30.7  |      | 30.7  | 30.7  |      |      |
| Actuated g/C Ratio      | 0.45  | 0.45  |      | 0.45  | 0.45  |      | 0.45  | 0.45  |      | 0.45  | 0.45  |      |      |
| v/c Ratio               | 1.13  | 1.13  |      | 1.13  | 1.13  |      | 1.13  | 1.13  |      | 1.13  | 1.13  |      |      |
| Control Delay           | 100.1 | 100.1 |      | 11.3  | 11.3  |      | 21.2  | 21.2  |      | 31.5  | 31.5  |      |      |
| Queue Delay             | 0.0   | 0.0   |      | 0.0   | 0.0   |      | 0.0   | 0.0   |      | 0.0   | 0.0   |      |      |
| Total Delay             | 100.1 | 100.1 |      | 11.3  | 11.3  |      | 21.2  | 21.2  |      | 31.5  | 31.5  |      |      |
| LOS                     | F     | F     |      | B     | B     |      | C     | C     |      | C     | C     |      |      |
| Approach Delay          | 100.1 | 100.1 |      | 11.3  | 11.3  |      | 21.2  | 21.2  |      | 31.5  | 31.5  |      |      |
| Approach LOS            | F     | F     |      | B     | B     |      | C     | C     |      | C     | C     |      |      |
| Queue Length 50th (ft)  | ~356  | ~356  |      | 15    | 15    |      | 77    | 77    |      | 166   | 166   |      |      |
| Queue Length 95th (ft)  | #805  | #805  |      | 61    | 61    |      | 197   | 197   |      | #447  | #447  |      |      |
| Internal Link Dist (ft) | 684   | 684   |      | 892   | 892   |      | 1975  | 1975  |      | 1473  | 1473  |      |      |
| Turn Bay Length (ft)    |       |       |      |       |       |      |       |       |      |       |       |      |      |
| Base Capacity (vph)     | 654   | 654   |      | 804   | 804   |      | 695   | 695   |      | 795   | 795   |      |      |
| Starvation Cap Reductn  | 0     | 0     |      | 0     | 0     |      | 0     | 0     |      | 0     | 0     |      |      |
| Spillback Cap Reductn   | 0     | 0     |      | 0     | 0     |      | 0     | 0     |      | 0     | 0     |      |      |
| Storage Cap Reductn     | 0     | 0     |      | 0     | 0     |      | 0     | 0     |      | 0     | 0     |      |      |
| Reduced v/c Ratio       | 1.13  | 1.13  |      | 0.13  | 0.13  |      | 0.39  | 0.39  |      | 0.66  | 0.66  |      |      |

Intersection Summary

|                                                                 |                        |
|-----------------------------------------------------------------|------------------------|
| Area Type:                                                      | Other                  |
| Cycle Length: 89                                                |                        |
| Actuated Cycle Length: 68.7                                     |                        |
| Natural Cycle: 130                                              |                        |
| Control Type: Actuated-Uncoordinated                            |                        |
| Maximum v/c Ratio: 1.13                                         |                        |
| Intersection Signal Delay: 59.4                                 | Intersection LOS: E    |
| Intersection Capacity Utilization 82.2%                         | ICU Level of Service E |
| Analysis Period (min) 15                                        |                        |
| ~ Volume exceeds capacity, queue is theoretically infinite.     |                        |
| # Queue shown is maximum after two cycles.                      |                        |
| # 95th percentile volume exceeds capacity, queue may be longer. |                        |
| Queue shown is maximum after two cycles.                        |                        |

Splits and Phases: 3: Chestnut Street & Elliot Street



Lanes, Volumes, Timings  
VHB/MSD

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07/03/2018

12239.00 :: Needham Street  
4: Oak Street & Chestnut Street

2025 Build Conditions - without Shuttle Service  
Timing Plan: Weekday Morning

| Lane Group              | EBL   | EBT   | EBR  | WBL   | WBT   | WBR  | NBL   | NBT   | NBR  | SBL   | SBT   | SBR  | Ø3   |
|-------------------------|-------|-------|------|-------|-------|------|-------|-------|------|-------|-------|------|------|
| Lane Configurations     |       | ↔     |      | ↔     | ↔     |      |       | ↔     |      | ↔     | ↔     |      |      |
| Traffic Volume (vph)    | 15    | 25    | 365  | 35    | 15    | 5    | 300   | 130   | 40   | 2     | 45    | 5    |      |
| Future Volume (vph)     | 15    | 25    | 365  | 35    | 15    | 5    | 300   | 130   | 40   | 2     | 45    | 5    |      |
| Ideal Flow (vphpl)      | 1900  | 1900  | 1900 | 1900  | 1900  | 1900 | 1900  | 1900  | 1900 | 1900  | 1900  | 1900 |      |
| Satd. Flow (prot)       | 0     | 1665  | 0    | 0     | 1818  | 0    | 0     | 1798  | 0    | 0     | 1832  | 0    |      |
| Fit Permitted           |       | 0.988 |      |       | 0.953 |      |       | 0.773 |      |       | 0.987 |      |      |
| Satd. Flow (perm)       | 0     | 1648  | 0    | 0     | 1662  | 0    | 0     | 1426  | 0    | 0     | 1811  | 0    |      |
| Right Turn on Red       |       |       | Yes  |       |       | Yes  |       |       | Yes  |       |       | Yes  |      |
| Satd. Flow (RTOR)       |       | 397   |      |       | 5     |      | 5     |       |      |       | 5     |      |      |
| Link Speed (mph)        |       | 30    |      |       | 30    |      | 30    |       |      |       | 30    |      |      |
| Link Distance (ft)      |       | 2055  |      |       | 492   |      | 226   |       |      |       | 762   |      |      |
| Travel Time (s)         |       | 46.7  |      |       | 11.2  |      | 5.1   |       |      |       | 17.3  |      |      |
| Confl. Peds. (#/hr)     | 1     |       |      |       |       | 1    | 6     |       | 6    | 6     |       | 6    |      |
| Confl. Bikes (#/hr)     |       |       |      |       |       |      |       |       |      |       |       |      | 1    |
| Peak Hour Factor        | 0.92  | 0.92  | 0.92 | 0.92  | 0.92  | 0.92 | 0.92  | 0.92  | 0.92 | 0.92  | 0.92  | 0.92 |      |
| Heavy Vehicles (%)      | 0%    | 0%    | 0%   | 0%    | 0%    | 0%   | 1%    | 1%    | 1%   | 2%    | 2%    | 2%   |      |
| Shared Lane Traffic (%) |       |       |      |       |       |      |       |       |      |       |       |      |      |
| Lane Group Flow (vph)   | 0     | 440   | 0    | 0     | 59    | 0    | 0     | 510   | 0    | 0     | 56    | 0    |      |
| Turn Type               | Perm  | NA    |      | Perm  | NA    |      | Perm  | NA    |      | Perm  | NA    |      |      |
| Protected Phases        |       | 1     |      |       | 1     |      |       | 2     |      |       | 2     |      | 3    |
| Permitted Phases        | 1     |       |      | 1     |       |      | 2     |       |      | 2     |       |      |      |
| Detector Phase          | 1     | 1     |      | 1     | 1     |      | 2     | 2     |      | 2     | 2     |      |      |
| Switch Phase            |       |       |      |       |       |      |       |       |      |       |       |      |      |
| Minimum Initial (s)     | 8.0   | 8.0   |      | 8.0   | 8.0   |      | 8.0   | 8.0   |      | 8.0   | 8.0   |      | 8.0  |
| Minimum Split (s)       | 13.0  | 13.0  |      | 13.0  | 13.0  |      | 14.0  | 14.0  |      | 14.0  | 14.0  |      | 18.0 |
| Total Split (s)         | 35.0  | 35.0  |      | 35.0  | 35.0  |      | 36.0  | 36.0  |      | 36.0  | 36.0  |      | 25.0 |
| Total Split (%)         | 36.5% | 36.5% |      | 36.5% | 36.5% |      | 37.5% | 37.5% |      | 37.5% | 37.5% |      | 26%  |
| Yellow Time (s)         | 4.0   | 4.0   |      | 4.0   | 4.0   |      | 4.0   | 4.0   |      | 4.0   | 4.0   |      | 4.0  |
| All-Red Time (s)        | 1.0   | 1.0   |      | 1.0   | 1.0   |      | 2.0   | 2.0   |      | 2.0   | 2.0   |      | 1.0  |
| Lost Time Adjust (s)    |       | 0.0   |      |       | 0.0   |      |       | 0.0   |      |       | 0.0   |      |      |
| Total Lost Time (s)     |       | 5.0   |      |       | 5.0   |      |       | 6.0   |      |       | 6.0   |      |      |
| Lead/Lag                | Lead  | Lead  |      | Lead  | Lead  |      | Lag   | Lag   |      | Lag   | Lag   |      |      |
| Lead-Lag Optimize?      |       |       |      |       |       |      |       |       |      |       |       |      |      |
| Recall Mode             | Min   | Min   |      | Min   | Min   |      | Min   | Min   |      | Min   | Min   |      | None |
| Act Effct Green (s)     | 11.7  | 11.7  |      | 11.7  | 11.7  |      | 31.1  | 31.1  |      | 31.1  | 31.1  |      |      |
| Actuated g/C Ratio      | 0.21  | 0.21  |      | 0.21  | 0.21  |      | 0.55  | 0.55  |      | 0.55  | 0.55  |      |      |
| v/c Ratio               | 0.67  | 0.67  |      | 0.42  | 0.42  |      | 0.65  | 0.65  |      | 0.65  | 0.65  |      |      |
| Control Delay           | 9.6   | 9.6   |      | 29.2  | 29.2  |      | 18.5  | 18.5  |      | 9.5   | 9.5   |      |      |
| Queue Delay             | 0.0   | 0.0   |      | 0.0   | 0.0   |      | 0.0   | 0.0   |      | 0.0   | 0.0   |      |      |
| Total Delay             | 9.6   | 9.6   |      | 29.2  | 29.2  |      | 18.5  | 18.5  |      | 9.5   | 9.5   |      |      |
| LOS                     | A     | A     |      | C     | C     |      | B     | B     |      | A     | A     |      |      |
| Approach Delay          | 9.6   | 9.6   |      | 29.2  | 29.2  |      | 18.5  | 18.5  |      | 9.5   | 9.5   |      |      |
| Approach LOS            | A     | A     |      | C     | C     |      | B     | B     |      | A     | A     |      |      |
| Queue Length 50th (ft)  | 11    | 11    |      | 14    | 14    |      | 80    | 80    |      | 5     | 5     |      |      |
| Queue Length 95th (ft)  | 94    | 94    |      | 57    | 57    |      | #445  | #445  |      | 40    | 40    |      |      |
| Internal Link Dist (ft) | 1975  | 1975  |      | 412   | 412   |      | 146   | 146   |      | 682   | 682   |      |      |
| Turn Bay Length (ft)    |       |       |      |       |       |      |       |       |      |       |       |      |      |
| Base Capacity (vph)     | 1082  | 1082  |      | 365   | 365   |      | 784   | 784   |      | 995   | 995   |      |      |
| Starvation Cap Reductn  | 0     | 0     |      | 0     | 0     |      | 0     | 0     |      | 0     | 0     |      |      |
| Spillback Cap Reductn   | 0     | 0     |      | 0     | 0     |      | 0     | 0     |      | 0     | 0     |      |      |
| Storage Cap Reductn     | 0     | 0     |      | 0     | 0     |      | 0     | 0     |      | 0     | 0     |      |      |
| Reduced v/c Ratio       | 0.41  | 0.41  |      | 0.16  | 0.16  |      | 0.65  | 0.65  |      | 0.66  | 0.66  |      |      |

Intersection Summary

|                                            |                        |
|--------------------------------------------|------------------------|
| Area Type:                                 | Other                  |
| Cycle Length: 96                           |                        |
| Actuated Cycle Length: 56.7                |                        |
| Natural Cycle: 65                          |                        |
| Control Type: Actuated-Uncoordinated       |                        |
| Maximum v/c Ratio: 0.67                    |                        |
| Intersection Signal Delay: 14.9            | Intersection LOS: B    |
| Intersection Capacity Utilization 66.3%    | ICU Level of Service C |
| Analysis Period (min) 15                   |                        |
| # Queue shown is maximum after two cycles. |                        |
| Queue shown is maximum after two cycles.   |                        |

Splits and Phases: 4: Oak Street & Chestnut Street



Lanes, Volumes, Timings  
VHB/MSD

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07/03/2018

12239.00 :: Needham Street  
5: Oak Street & Site Driveway

2025 Build Conditions - without Shuttle Service  
Timing Plan: Weekday Morning

| Intersection             |        |       |        |       |       |      |
|--------------------------|--------|-------|--------|-------|-------|------|
| Int Delay, s/veh         | 1.7    |       |        |       |       |      |
| Movement                 | WBL    | WBR   | NBT    | NBR   | SBL   | SBT  |
| Lane Configurations      | ↵      |       | ↵      |       |       | ↵    |
| Traffic Vol, veh/h       | 40     | 30    | 440    | 50    | 40    | 405  |
| Future Vol, veh/h        | 40     | 30    | 440    | 50    | 40    | 405  |
| Conflicting Peds, #/hr   | 4      | 0     | 0      | 3     | 3     | 0    |
| Sign Control             | Stop   | Stop  | Free   | Free  | Free  | Free |
| RT Channelized           | -      | None  | -      | None  | -     | None |
| Storage Length           | 0      | -     | -      | -     | -     | -    |
| Veh in Median Storage, # | 0      | -     | 0      | -     | -     | 0    |
| Grade, %                 | 0      | -     | 0      | -     | -     | 0    |
| Peak Hour Factor         | 92     | 92    | 92     | 92    | 92    | 92   |
| Heavy Vehicles, %        | 0      | 0     | 1      | 1     | 1     | 1    |
| Mvmt Flow                | 43     | 33    | 478    | 54    | 43    | 440  |
| Major/Minor              |        |       |        |       |       |      |
| Minor1                   | Major1 |       | Major2 |       |       |      |
| Conflicting Flow All     | 1039   | 508   | 0      | 0     | 536   | 0    |
| Stage 1                  | 508    | -     | -      | -     | -     | -    |
| Stage 2                  | 531    | -     | -      | -     | -     | -    |
| Critical Hdwy            | 6.4    | 6.2   | -      | -     | 4.11  | -    |
| Critical Hdwy Stg 1      | 5.4    | -     | -      | -     | -     | -    |
| Critical Hdwy Stg 2      | 5.4    | -     | -      | -     | -     | -    |
| Follow-up Hdwy           | 3.5    | 3.3   | -      | -     | 2.209 | -    |
| Pot Cap-1 Maneuver       | 258    | 569   | -      | -     | 1037  | -    |
| Stage 1                  | 608    | -     | -      | -     | -     | -    |
| Stage 2                  | 594    | -     | -      | -     | -     | -    |
| Platoon blocked, %       |        |       | -      | -     | -     | -    |
| Mov Cap-1 Maneuver       | 242    | 568   | -      | -     | 1037  | -    |
| Mov Cap-2 Maneuver       | 242    | -     | -      | -     | -     | -    |
| Stage 1                  | 606    | -     | -      | -     | -     | -    |
| Stage 2                  | 559    | -     | -      | -     | -     | -    |
| Approach                 |        |       |        |       |       |      |
| WB                       | NB     |       | SB     |       |       |      |
| HCM Control Delay, s     | 19.7   | 0     | 0.8    |       |       |      |
| HCM LOS                  | C      |       |        |       |       |      |
| Minor Lane/Major Mvmt    |        |       |        |       |       |      |
| NBT                      | NBR    | WBLn1 | SBL    | SBT   |       |      |
| Capacity (veh/h)         | -      | -     | 321    | 1037  | -     | -    |
| HCM Lane V/C Ratio       | -      | -     | 0.237  | 0.042 | -     | -    |
| HCM Control Delay (s)    | -      | -     | 19.7   | 8.6   | 0     | -    |
| HCM Lane LOS             | -      | -     | C      | A     | A     | -    |
| HCM 95th %tile Q(veh)    | -      | -     | 0.9    | 0.1   | -     | -    |

12239.00 :: Needham Street  
6: Needham Street & Oak Street/Christina Street

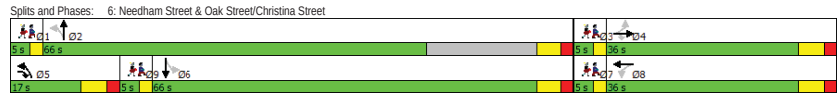
2025 Build Conditions - without Shuttle Service  
Timing Plan: Weekday Morning

| <div>↖ ↗ ↘ ↙ ↠ ↡ ↢ ↣ ↤ ↥ ↦ ↧ ↨</div>                            |                        |       |       |       |       |      |       |       |      |       |       |      |      |      |      |      |
|-----------------------------------------------------------------|------------------------|-------|-------|-------|-------|------|-------|-------|------|-------|-------|------|------|------|------|------|
| Lane Group                                                      | EBL                    | EBT   | EBR   | WBL   | WBT   | WBR  | NBL   | NBT   | NBR  | SBL   | SBT   | SBR  | Ø1   | Ø3   | Ø7   | Ø9   |
| Lane Configurations                                             |                        |       |       |       |       |      |       |       |      |       |       |      |      |      |      |      |
| Traffic Volume (vph)                                            | 140                    | 125   | 180   | 130   | 205   | 30   | 170   | 820   | 70   | 30    | 725   | 100  |      |      |      |      |
| Future Volume (vph)                                             | 140                    | 125   | 180   | 130   | 205   | 30   | 170   | 820   | 70   | 30    | 725   | 100  |      |      |      |      |
| Ideal Flow (vphpl)                                              | 1900                   | 1900  | 1900  | 1900  | 1900  | 1900 | 1900  | 1900  | 1900 | 1900  | 1900  | 1900 |      |      |      |      |
| Storage Length (ft)                                             | 0                      |       | 100   | 200   |       | 50   | 0     |       | 0    | 220   | 0     |      |      |      |      |      |
| Storage Lanes                                                   | 0                      |       | 1     | 1     |       | 0    | 1     |       | 0    | 1     | 1     | 0    |      |      |      |      |
| Taper Length (ft)                                               | 25                     |       |       | 25    |       |      | 25    |       |      | 25    |       |      |      |      |      |      |
| Satd. Flow (prot)                                               | 0                      | 1832  | 1599  | 1805  | 1852  | 0    | 1787  | 1854  | 0    | 1770  | 1823  | 0    |      |      |      |      |
| Flt Permitted                                                   | 0.439                  |       |       | 0.411 |       |      | 0.058 |       |      | 0.146 |       |      |      |      |      |      |
| Satd. Flow (perm)                                               | 0                      | 820   | 1599  | 781   | 1852  | 0    | 109   | 1854  | 0    | 272   | 1823  | 0    |      |      |      |      |
| Right Turn on Red                                               |                        |       | Yes   |       |       | Yes  |       |       | Yes  |       |       | Yes  |      |      |      |      |
| Satd. Flow (RTOR)                                               |                        |       | 149   |       | 5     |      |       | 6     |      |       | 7     |      |      |      |      |      |
| Link Speed (mph)                                                |                        | 30    |       |       | 30    |      |       | 30    |      |       | 30    |      |      |      |      |      |
| Link Distance (ft)                                              |                        | 1238  |       |       | 516   |      |       | 754   |      |       | 366   |      |      |      |      |      |
| Travel Time (s)                                                 |                        | 28.1  |       |       | 11.7  |      |       | 17.1  |      |       | 8.3   |      |      |      |      |      |
| Confl. Peds. (#/hr)                                             | 6                      |       |       |       |       | 6    | 2     |       | 2    | 2     |       | 2    |      |      |      |      |
| Peak Hour Factor                                                | 0.92                   | 0.92  | 0.92  | 0.92  | 0.92  | 0.92 | 0.92  | 0.92  | 0.92 | 0.92  | 0.92  | 0.92 |      |      |      |      |
| Heavy Vehicles (%)                                              | 1%                     | 1%    | 1%    | 0%    | 0%    | 0%   | 1%    | 1%    | 1%   | 2%    | 2%    | 2%   |      |      |      |      |
| Shared Lane Traffic (%)                                         |                        |       |       |       |       |      |       |       |      |       |       |      |      |      |      |      |
| Lane Group Flow (vph)                                           | 0                      | 288   | 196   | 141   | 256   | 0    | 185   | 967   | 0    | 33    | 897   | 0    |      |      |      |      |
| Turn Type                                                       | Perm                   | NA    | pm+ov | Perm  | NA    |      | pm+pt | NA    |      | Perm  | NA    |      |      |      |      |      |
| Protected Phases                                                |                        |       |       |       |       |      |       |       |      |       |       |      | 1    | 3    | 7    | 9    |
| Permitted Phases                                                | 4                      | 4     | 5     | 8     | 8     |      | 2     |       |      | 6     |       |      |      |      |      |      |
| Detector Phase                                                  | 4                      | 4     | 5     | 8     | 8     |      | 5     | 2     |      | 6     | 6     |      |      |      |      |      |
| Switch Phase                                                    |                        |       |       |       |       |      |       |       |      |       |       |      |      |      |      |      |
| Minimum Initial (s)                                             | 6.0                    | 6.0   | 6.0   | 6.0   | 6.0   |      | 6.0   | 15.0  |      | 15.0  | 15.0  |      | 3.0  | 3.0  | 3.0  | 3.0  |
| Minimum Split (s)                                               | 22.0                   | 22.0  | 13.0  | 26.0  | 26.0  |      | 13.0  | 29.0  |      | 28.0  | 28.0  |      | 5.0  | 5.0  | 5.0  | 5.0  |
| Total Split (s)                                                 | 36.0                   | 36.0  | 17.0  | 36.0  | 36.0  |      | 17.0  | 66.0  |      | 66.0  | 66.0  |      | 5.0  | 5.0  | 5.0  | 5.0  |
| Total Split (%)                                                 | 27.9%                  | 27.9% | 13.2% | 27.9% | 27.9% |      | 13.2% | 51.2% |      | 51.2% | 51.2% |      | 4%   | 4%   | 4%   | 4%   |
| Yellow Time (s)                                                 | 4.0                    | 4.0   | 4.0   | 4.0   | 4.0   |      | 4.0   | 4.0   |      | 4.0   | 4.0   |      | 2.0  | 2.0  | 2.0  | 2.0  |
| All-Red Time (s)                                                | 2.0                    | 2.0   | 2.0   | 2.0   | 2.0   |      | 2.0   | 2.0   |      | 2.0   | 2.0   |      | 0.0  | 0.0  | 0.0  | 0.0  |
| Lost Time Adjust (s)                                            | 0.0                    | 0.0   | 0.0   | 0.0   | 0.0   |      | 0.0   | 0.0   |      | 0.0   | 0.0   |      |      |      |      |      |
| Total Lost Time (s)                                             | 6.0                    | 6.0   | 6.0   | 6.0   | 6.0   |      | 6.0   | 6.0   |      | 6.0   | 6.0   |      |      |      |      |      |
| Lead/Lag                                                        | Lag                    | Lag   | Lead  | Lag   | Lag   |      | Lead  | Lag   |      |       |       |      | Lead | Lead | Lead | Lag  |
| Lead-Lag Optimize?                                              |                        |       |       |       |       |      |       |       |      |       |       |      |      |      |      |      |
| Recall Mode                                                     | None                   | None  | None  | None  | None  |      | None  | None  |      | None  | None  |      | None | None | None | None |
| Act Effect Green (s)                                            |                        | 31.0  | 48.0  | 30.0  | 30.0  |      | 78.0  | 77.1  |      | 60.1  | 60.1  |      |      |      |      |      |
| Actuated g/C Ratio                                              |                        | 0.26  | 0.40  | 0.25  | 0.25  |      | 0.64  | 0.64  |      | 0.50  | 0.50  |      |      |      |      |      |
| v/c Ratio                                                       |                        | 1.38  | 0.27  | 0.73  | 0.55  |      | 0.83  | 0.82  |      | 0.24  | 0.99  |      |      |      |      |      |
| Control Delay                                                   |                        | 232.3 | 7.9   | 65.3  | 44.7  |      | 58.2  | 24.4  |      | 24.7  | 57.7  |      |      |      |      |      |
| Queue Delay                                                     |                        | 0.0   | 0.0   | 0.0   | 0.0   |      | 0.0   | 0.0   |      | 0.0   | 9.7   |      |      |      |      |      |
| Total Delay                                                     |                        | 232.3 | 7.9   | 65.3  | 44.7  |      | 58.2  | 24.4  |      | 24.7  | 67.4  |      |      |      |      |      |
| LOS                                                             |                        | F     | A     | E     | D     |      | E     | C     |      | C     | E     |      |      |      |      |      |
| Approach Delay                                                  |                        | 141.4 |       |       | 52.0  |      |       | 29.8  |      |       | 65.9  |      |      |      |      |      |
| Approach LOS                                                    |                        | F     |       |       | D     |      |       | C     |      |       | E     |      |      |      |      |      |
| Queue Length 50th (ft)                                          |                        | ~295  | 22    | 99    | 168   |      | 90    | 502   |      | 14    | 645   |      |      |      |      |      |
| Queue Length 95th (ft)                                          |                        | #488  | 75    | #224  | 281   |      | #238  | #895  |      | 45    | #1070 |      |      |      |      |      |
| Internal Link Dist (ft)                                         |                        | 1158  |       |       | 436   |      |       | 674   |      |       | 286   |      |      |      |      |      |
| Turn Bay Length (ft)                                            |                        |       | 100   | 200   |       |      |       |       |      | 220   |       |      |      |      |      |      |
| Base Capacity (vph)                                             |                        | 209   | 724   | 193   | 463   |      | 222   | 1183  |      | 135   | 908   |      |      |      |      |      |
| Starvation Cap Reductn                                          |                        | 0     | 0     | 0     | 0     |      | 0     | 0     |      | 0     | 33    |      |      |      |      |      |
| Spillback Cap Reductn                                           |                        | 0     | 0     | 0     | 0     |      | 0     | 0     |      | 0     | 0     |      |      |      |      |      |
| Storage Cap Reductn                                             |                        | 0     | 0     | 0     | 0     |      | 0     | 0     |      | 0     | 0     |      |      |      |      |      |
| Reduced v/c Ratio                                               |                        | 1.38  | 0.27  | 0.73  | 0.55  |      | 0.83  | 0.82  |      | 0.24  | 1.03  |      |      |      |      |      |
| Intersection Summary                                            |                        |       |       |       |       |      |       |       |      |       |       |      |      |      |      |      |
| Area Type:                                                      | Other                  |       |       |       |       |      |       |       |      |       |       |      |      |      |      |      |
| Cycle Length: 129                                               |                        |       |       |       |       |      |       |       |      |       |       |      |      |      |      |      |
| Actuated Cycle Length: 121                                      |                        |       |       |       |       |      |       |       |      |       |       |      |      |      |      |      |
| Natural Cycle: 150                                              |                        |       |       |       |       |      |       |       |      |       |       |      |      |      |      |      |
| Control Type: Actuated-Uncoordinated                            |                        |       |       |       |       |      |       |       |      |       |       |      |      |      |      |      |
| Maximum v/c Ratio: 1.38                                         |                        |       |       |       |       |      |       |       |      |       |       |      |      |      |      |      |
| Intersection Signal Delay: 62.3                                 | Intersection LOS: E    |       |       |       |       |      |       |       |      |       |       |      |      |      |      |      |
| Intersection Capacity Utilization 106.9%                        | ICU Level of Service G |       |       |       |       |      |       |       |      |       |       |      |      |      |      |      |
| Analysis Period (min) 15                                        |                        |       |       |       |       |      |       |       |      |       |       |      |      |      |      |      |
| - Volume exceeds capacity, queue is theoretically infinite.     |                        |       |       |       |       |      |       |       |      |       |       |      |      |      |      |      |
| - Queue shown is maximum after two cycles.                      |                        |       |       |       |       |      |       |       |      |       |       |      |      |      |      |      |
| # 95th percentile volume exceeds capacity, queue may be longer. |                        |       |       |       |       |      |       |       |      |       |       |      |      |      |      |      |
| - Queue shown is maximum after two cycles.                      |                        |       |       |       |       |      |       |       |      |       |       |      |      |      |      |      |



12239.00 :: Needham Street  
6: Needham Street & Oak Street/Christina Street

2025 Build Conditions - without Shuttle Service  
Timing Plan: Weekday Morning



12239.00 :: Needham Street  
7: Needham Street & South Site Driveway

2025 Build Conditions - without Shuttle Service  
Timing Plan: Weekday Morning

| Intersection             |        |       |        |       |        |      |
|--------------------------|--------|-------|--------|-------|--------|------|
| Int Delay, s/veh         | 1.2    |       |        |       |        |      |
| Movement                 | EBL    | EBR   | NBL    | NBT   | SBT    | SBR  |
| Lane Configurations      | ↔      |       | ↔      | ↕     | ↕      |      |
| Traffic Vol, veh/h       | 10     | 55    | 20     | 970   | 800    | 25   |
| Future Vol, veh/h        | 10     | 55    | 20     | 970   | 800    | 25   |
| Conflicting Peds, #/hr   | 0      | 0     | 2      | 0     | 0      | 2    |
| Sign Control             | Stop   | Stop  | Free   | Free  | Free   | Free |
| RT Channelized           | -      | None  | -      | None  | -      | None |
| Storage Length           | 0      | -     | 50     | -     | -      | -    |
| Veh in Median Storage, # | 0      | -     | -      | 0     | 0      | -    |
| Grade, %                 | 0      | -     | -      | 0     | 0      | -    |
| Peak Hour Factor         | 92     | 92    | 92     | 92    | 92     | 92   |
| Heavy Vehicles, %        | 0      | 0     | 1      | 1     | 2      | 2    |
| Mvmt Flow                | 11     | 60    | 22     | 1054  | 870    | 27   |
| Major/Minor              |        |       |        |       |        |      |
|                          | Minor2 |       | Major1 |       | Major2 |      |
| Conflicting Flow All     | 1983   | 885   | 899    | 0     | -      | 0    |
| Stage 1                  | 885    | -     | -      | -     | -      | -    |
| Stage 2                  | 1098   | -     | -      | -     | -      | -    |
| Critical Hdwy            | 6.4    | 6.2   | 4.11   | -     | -      | -    |
| Critical Hdwy Stg 1      | 5.4    | -     | -      | -     | -      | -    |
| Critical Hdwy Stg 2      | 5.4    | -     | -      | -     | -      | -    |
| Follow-up Hdwy           | 3.5    | 3.3   | 2.209  | -     | -      | -    |
| Pot Cap-1 Maneuver       | 68     | 347   | 760    | -     | -      | -    |
| Stage 1                  | 407    | -     | -      | -     | -      | -    |
| Stage 2                  | 322    | -     | -      | -     | -      | -    |
| Platoon blocked, %       | -      | -     | -      | -     | -      | -    |
| Mov Cap-1 Maneuver       | 66     | 346   | 760    | -     | -      | -    |
| Mov Cap-2 Maneuver       | 66     | -     | -      | -     | -      | -    |
| Stage 1                  | 406    | -     | -      | -     | -      | -    |
| Stage 2                  | 312    | -     | -      | -     | -      | -    |
| Approach                 |        |       |        |       |        |      |
|                          | EB     |       | NB     |       | SB     |      |
| HCM Control Delay, s     | 30.8   |       | 0.2    |       | 0      |      |
| HCM LOS                  | D      |       |        |       |        |      |
| Minor Lane/Major Mvmt    |        |       |        |       |        |      |
|                          |        | NBL   | NBT    | EbLn1 | SBT    | SBR  |
| Capacity (veh/h)         |        | 760   | -      | 209   | -      | -    |
| HCM Lane V/C Ratio       |        | 0.029 | -      | 0.338 | -      | -    |
| HCM Control Delay (s)    |        | 9.9   | -      | 30.8  | -      | -    |
| HCM Lane LOS             |        | A     | -      | D     | -      | -    |
| HCM 95th %ile Q(veh)     |        | 0.1   | -      | 1.4   | -      | -    |

2025 Build Conditions - without Shuttle Service  
Timing Plan: Weekday Morning

12239.00 :: Needham Street  
9: Needham Street & North Site Driveway/Charlemont Street

2025 Build Conditions - without Shuttle Service  
Timing Plan: Weekday Morning

| Intersection Summary                                            |                        |
|-----------------------------------------------------------------|------------------------|
| Area Type:                                                      | Other                  |
| Cycle Length:                                                   | 104                    |
| Actuated Cycle Length:                                          | 73.2                   |
| Natural Cycle:                                                  | 90                     |
| Control Type:                                                   | Actuated-Uncoordinated |
| Maximum v/c Ratio:                                              | 0.71                   |
| Intersection Signal Delay:                                      | 16.0                   |
| Intersection Capacity Utilization:                              | 72.4%                  |
| Analysis Period (min):                                          | 15                     |
| # 95th percentile volume exceeds capacity, queue may be longer. |                        |
| Queue shown is maximum after two cycles.                        |                        |

12239.00 :: Needham Street  
10: Needham Street & Tower Road/Industrial Place

2025 Build Conditions - without Shuttle Service  
Timing Plan: Weekday Morning

| Intersection             |        |       |        |       |        |       |        |      |      |       |      |      |
|--------------------------|--------|-------|--------|-------|--------|-------|--------|------|------|-------|------|------|
| Int Delay, s/veh         | 4.5    |       |        |       |        |       |        |      |      |       |      |      |
| Movement                 | EBL    | EBT   | EBR    | WBL   | WBT    | WBR   | NBL    | NBT  | NBR  | SBL   | SBT  | SBR  |
| Lane Configurations      |        | ↕     |        |       | ↕      |       |        | ↕    |      | ↕     | ↕    |      |
| Traffic Vol, veh/h       | 30     | 0     | 15     | 5     | 0      | 10    | 15     | 820  | 15   | 5     | 870  | 50   |
| Future Vol, veh/h        | 30     | 0     | 15     | 5     | 0      | 10    | 15     | 820  | 15   | 5     | 870  | 50   |
| Conflicting Peds, #/hr   | 0      | 0     | 1      | 1     | 0      | 0     | 4      | 0    | 2    | 2     | 0    | 4    |
| Sign Control             | Stop   | Stop  | Stop   | Stop  | Stop   | Stop  | Free   | Free | Free | Free  | Free | Free |
| RT Channelized           | -      | -     | None   | -     | -      | None  | -      | -    | None | -     | -    | None |
| Storage Length           | -      | -     | -      | -     | -      | -     | -      | -    | -    | 100   | -    | -    |
| Veh in Median Storage, # | -      | 0     | -      | -     | 0      | -     | -      | 0    | -    | -     | 0    | -    |
| Grade, %                 | -      | 0     | -      | -     | 0      | -     | -      | 0    | -    | -     | 0    | -    |
| Peak Hour Factor         | 92     | 92    | 92     | 92    | 92     | 92    | 92     | 92   | 92   | 92    | 92   | 92   |
| Heavy Vehicles, %        | 5      | 5     | 5      | 13    | 13     | 13    | 3      | 3    | 3    | 2     | 2    | 2    |
| Mvmt Flow                | 33     | 0     | 16     | 5     | 0      | 11    | 16     | 891  | 16   | 5     | 946  | 54   |
| Major/Minor              | Minor2 |       | Minor1 |       | Major1 |       | Major2 |      |      |       |      |      |
| Conflicting Flow All     | 1926   | 1930  | 978    | 1927  | 1949   | 901   | 1004   | 0    | 0    | 910   | 0    | 0    |
| Stage 1                  | 988    | 988   | -      | 934   | 934    | -     | -      | -    | -    | -     | -    | -    |
| Stage 2                  | 938    | 942   | -      | 993   | 1015   | -     | -      | -    | -    | -     | -    | -    |
| Critical Hdwy            | 7.15   | 6.55  | 6.25   | 7.23  | 6.63   | 6.33  | 4.13   | -    | -    | 4.12  | -    | -    |
| Critical Hdwy Stg 1      | 6.15   | 5.55  | -      | 6.23  | 5.63   | -     | -      | -    | -    | -     | -    | -    |
| Critical Hdwy Stg 2      | 6.15   | 5.55  | -      | 6.23  | 5.63   | -     | -      | -    | -    | -     | -    | -    |
| Follow-up Hdwy           | 3.545  | 4.045 | 3.345  | 3.617 | 4.117  | 3.417 | 2.227  | -    | -    | 2.218 | -    | -    |
| Pot Cap-1 Maneuver       | 49     | 65    | 300    | 47    | 60     | 321   | 686    | -    | -    | 748   | -    | -    |
| Stage 1                  | 294    | 321   | -      | 305   | 330    | -     | -      | -    | -    | -     | -    | -    |
| Stage 2                  | 313    | 338   | -      | 282   | 302    | -     | -      | -    | -    | -     | -    | -    |
| Platoon blocked, %       | -      | -     | -      | -     | -      | -     | -      | -    | -    | -     | -    | -    |
| Mov Cap-1 Maneuver       | 45     | 61    | 299    | 43    | 57     | 320   | 685    | -    | -    | 748   | -    | -    |
| Mov Cap-2 Maneuver       | 45     | 61    | -      | 43    | 57     | -     | -      | -    | -    | -     | -    | -    |
| Stage 1                  | 279    | 318   | -      | 290   | 314    | -     | -      | -    | -    | -     | -    | -    |
| Stage 2                  | 288    | 322   | -      | 265   | 299    | -     | -      | -    | -    | -     | -    | -    |
| Approach                 | EB     |       | WB     |       | NB     |       | SB     |      |      |       |      |      |
| HCM Control Delay, s     | 161.8  |       | 46.9   |       | 0.2    |       | 0.1    |      |      |       |      |      |
| HCM LOS                  | F      |       | E      |       |        |       |        |      |      |       |      |      |
| Minor Lane/Major Mvmt    | NBL    | NBT   | NBR    | EBLn1 | WBLn1  | SBL   | SBT    | SBR  |      |       |      |      |
| Capacity (veh/h)         | 685    | -     | -      | 63    | 102    | 748   | -      | -    |      |       |      |      |
| HCM Lane V/C Ratio       | 0.024  | -     | -      | 0.776 | 0.16   | 0.007 | -      | -    |      |       |      |      |
| HCM Control Delay (s)    | 10.4   | 0     | -      | 161.8 | 46.9   | 9.8   | -      | -    |      |       |      |      |
| HCM Lane LOS             | B      | A     | -      | F     | E      | A     | -      | -    |      |       |      |      |
| HCM 95th %ile Q(veh)     | 0.1    | -     | -      | 3.5   | 0.5    | 0     | -      | -    |      |       |      |      |

12239.00 :: Needham Street  
11: Needham Street & Jaconnet Street

2025 Build Conditions - without Shuttle Service  
Timing Plan: Weekday Morning

| Intersection             |        |      |        |       |        |      |
|--------------------------|--------|------|--------|-------|--------|------|
| Int Delay, s/veh         | 0.3    |      |        |       |        |      |
| Movement                 | WBL    | WBR  | NBT    | NBR   | SBL    | SBT  |
| Lane Configurations      | ↵      |      | ↵      |       | ↵      | ↵    |
| Traffic Vol, veh/h       | 5      | 10   | 830    | 20    | 2      | 920  |
| Future Vol, veh/h        | 5      | 10   | 830    | 20    | 2      | 920  |
| Conflicting Peds, #/hr   | 0      | 1    | 0      | 17    | 17     | 0    |
| Sign Control             | Stop   | Stop | Free   | Free  | Free   | Free |
| RT Channelized           | -      | None | -      | None  | -      | None |
| Storage Length           | 0      | -    | -      | -     | 100    | -    |
| Veh in Median Storage, # | 0      | -    | 0      | -     | -      | 0    |
| Grade, %                 | 0      | -    | 0      | -     | -      | 0    |
| Peak Hour Factor         | 92     | 92   | 92     | 92    | 92     | 92   |
| Heavy Vehicles, %        | 0      | 0    | 2      | 2     | 2      | 2    |
| Mvmt Flow                | 5      | 11   | 902    | 22    | 2      | 1000 |
| Major/Minor              | Minor1 |      | Major1 |       | Major2 |      |
| Conflicting Flow All     | 1934   | 931  | 0      | 0     | 941    | 0    |
| Stage 1                  | 930    | -    | -      | -     | -      | -    |
| Stage 2                  | 1004   | -    | -      | -     | -      | -    |
| Critical Hdwy            | 6.4    | 6.2  | -      | -     | 4.12   | -    |
| Critical Hdwy Stg 1      | 5.4    | -    | -      | -     | -      | -    |
| Critical Hdwy Stg 2      | 5.4    | -    | -      | -     | -      | -    |
| Follow-up Hdwy           | 3.5    | 3.3  | -      | -     | 2.218  | -    |
| Pot Cap-1 Maneuver       | 73     | 326  | -      | -     | 729    | -    |
| Stage 1                  | 387    | -    | -      | -     | -      | -    |
| Stage 2                  | 357    | -    | -      | -     | -      | -    |
| Platoon blocked, %       |        |      |        |       |        |      |
| Mov Cap-1 Maneuver       | 72     | 321  | -      | -     | 728    | -    |
| Mov Cap-2 Maneuver       | 72     | -    | -      | -     | -      | -    |
| Stage 1                  | 382    | -    | -      | -     | -      | -    |
| Stage 2                  | 356    | -    | -      | -     | -      | -    |
| Approach                 | WB     |      | NB     |       | SB     |      |
| HCM Control Delay, s     | 32.1   |      | 0      |       | 0      |      |
| HCM LOS                  | D      |      |        |       |        |      |
| Minor Lane/Major Mvmt    | NBT    | NBR  | WBLn1  | SBL   | SBT    |      |
| Capacity (veh/h)         | -      | -    | 149    | 728   | -      |      |
| HCM Lane V/C Ratio       | -      | -    | 0.109  | 0.003 | -      |      |
| HCM Control Delay (s)    | -      | -    | 32.1   | 10    | -      |      |
| HCM Lane LOS             | -      | -    | D      | A     | -      |      |
| HCM 95th %ile Q(veh)     | -      | -    | 0.4    | 0     | -      |      |

12239.00 :: Needham Street  
12: Needham Street & Rockland Street

2025 Build Conditions - without Shuttle Service  
Timing Plan: Weekday Morning

| Intersection             |        |       |        |       |       |      |
|--------------------------|--------|-------|--------|-------|-------|------|
| Int Delay, s/veh         | 0.3    |       |        |       |       |      |
| Movement                 | WBL    | WBR   | NBT    | NBR   | SBL   | SBT  |
| Lane Configurations      | W      |       | W      |       | W     | W    |
| Traffic Vol, veh/h       | 5      | 5     | 785    | 5     | 10    | 965  |
| Future Vol, veh/h        | 5      | 5     | 785    | 5     | 10    | 965  |
| Conflicting Peds, #/hr   | 1      | 0     | 0      | 9     | 9     | 0    |
| Sign Control             | Stop   | Stop  | Free   | Free  | Free  | Free |
| RT Channelized           | -      | None  | -      | None  | -     | None |
| Storage Length           | 0      | -     | -      | -     | 125   | -    |
| Veh in Median Storage, # | 0      | -     | 0      | -     | -     | 0    |
| Grade, %                 | 0      | -     | 0      | -     | -     | 0    |
| Peak Hour Factor         | 92     | 92    | 92     | 92    | 92    | 92   |
| Heavy Vehicles, %        | 0      | 0     | 2      | 2     | 2     | 2    |
| Mvmt Flow                | 5      | 5     | 853    | 5     | 11    | 1049 |
| Major/Minor              |        |       |        |       |       |      |
| Minor1                   | Major1 |       | Major2 |       |       |      |
| Conflicting Flow All     | 1937   | 865   | 0      | 0     | 868   | 0    |
| Stage 1                  | 865    | -     | -      | -     | -     | -    |
| Stage 2                  | 1072   | -     | -      | -     | -     | -    |
| Critical Hdwy            | 6.4    | 6.2   | -      | -     | 4.12  | -    |
| Critical Hdwy Stg 1      | 5.4    | -     | -      | -     | -     | -    |
| Critical Hdwy Stg 2      | 5.4    | -     | -      | -     | -     | -    |
| Follow-up Hdwy           | 3.5    | 3.3   | -      | -     | 2.218 | -    |
| Pot Cap-1 Maneuver       | 73     | 356   | -      | -     | 776   | -    |
| Stage 1                  | 416    | -     | -      | -     | -     | -    |
| Stage 2                  | 332    | -     | -      | -     | -     | -    |
| Platoon blocked, %       | -      | -     | -      | -     | -     | -    |
| Mov Cap-1 Maneuver       | 71     | 353   | -      | -     | 776   | -    |
| Mov Cap-2 Maneuver       | 71     | -     | -      | -     | -     | -    |
| Stage 1                  | 413    | -     | -      | -     | -     | -    |
| Stage 2                  | 327    | -     | -      | -     | -     | -    |
| Approach                 |        |       |        |       |       |      |
| WB                       | NB     |       | SB     |       |       |      |
| HCM Control Delay, s     | 38.6   | 0     | 0.1    |       |       |      |
| HCM LOS                  | E      |       |        |       |       |      |
| Minor Lane/Major Mvmt    |        |       |        |       |       |      |
| NBT                      | NBR    | WBLn1 | SBL    | SBT   |       |      |
| Capacity (veh/h)         | -      | -     | 118    | 776   | -     | -    |
| HCM Lane V/C Ratio       | -      | -     | 0.092  | 0.014 | -     | -    |
| HCM Control Delay (s)    | -      | -     | 38.6   | 9.7   | -     | -    |
| HCM Lane LOS             | -      | -     | E      | A     | -     | -    |
| HCM 95th %tile Q(veh)    | -      | -     | 0.3    | 0     | -     | -    |

12239.00 :: Needham Street  
13: Needham Street & Avalon Driveway/Columbia Avenue

2025 Build Conditions - without Shuttle Service  
Timing Plan: Weekday Morning

| Lane Group              | EBL   | EBT   | EBR   | WBL   | WBT   | WBR  | NBL   | NBT   | NBR  | SBL   | SBT   | SBR  | Ø1   | Ø3   | Ø5   | Ø7   |
|-------------------------|-------|-------|-------|-------|-------|------|-------|-------|------|-------|-------|------|------|------|------|------|
| Lane Configurations     | EB    | EB    | EB    | WB    | WB    | WB   | NB    | NB    | NB   | SB    | SB    | SB   |      |      |      |      |
| Traffic Volume (vph)    | 25    | 0     | 25    | 15    | 5     | 15   | 15    | 775   | 1    | 1     | 960   | 15   |      |      |      |      |
| Future Volume (vph)     | 25    | 0     | 25    | 15    | 5     | 15   | 15    | 775   | 1    | 1     | 960   | 15   |      |      |      |      |
| Ideal Flow (vphpl)      | 1900  | 1900  | 1900  | 1900  | 1900  | 1900 | 1900  | 1900  | 1900 | 1900  | 1900  | 1900 |      |      |      |      |
| Storage Length (ft)     | 0     |       | 50    | 0     |       | 0    | 125   | 0     |      | 0     | 100   | 0    |      |      |      |      |
| Storage Lanes           | 0     |       | 1     | 0     |       | 0    | 1     | 0     |      | 0     | 1     | 0    |      |      |      |      |
| Taper Length (ft)       | 25    |       |       | 25    |       |      | 25    |       |      | 25    |       |      |      |      |      |      |
| Satd. Flow (prot)       | 0     | 1736  | 1553  | 0     | 1713  | 0    | 1752  | 1845  | 0    | 1770  | 1858  | 0    |      |      |      |      |
| Flt Permitted           |       |       |       |       | 0.848 |      | 0.154 |       |      | 0.272 |       |      |      |      |      |      |
| Satd. Flow (perm)       | 0     | 1770  | 1511  | 0     | 1479  | 0    | 284   | 1845  | 0    | 507   | 1858  | 0    |      |      |      |      |
| Right Turn on Red       |       | Yes   |       |       | Yes   |      |       | Yes   |      |       | Yes   |      |      |      |      |      |
| Satd. Flow (RTOR)       |       | 80    |       |       | 16    |      |       |       |      |       | 2     |      |      |      |      |      |
| Link Speed (mph)        | 30    |       |       | 30    |       |      | 30    |       |      |       | 30    |      |      |      |      |      |
| Link Distance (ft)      | 190   |       |       | 435   |       |      | 338   |       |      |       | 1135  |      |      |      |      |      |
| Travel Time (s)         | 4.3   |       |       | 9.9   |       |      | 7.7   |       |      |       | 25.8  |      |      |      |      |      |
| Confl. Peds. (#/hr)     | 11    |       | 2     | 2     |       | 11   | 8     |       | 5    | 5     |       | 8    |      |      |      |      |
| Confl. Bikes (#/hr)     |       |       |       |       |       |      |       | 1     |      |       |       |      |      |      |      |      |
| Peak Hour Factor        | 0.92  | 0.92  | 0.92  | 0.92  | 0.92  | 0.92 | 0.92  | 0.92  | 0.92 | 0.92  | 0.92  | 0.92 |      |      |      |      |
| Heavy Vehicles (%)      | 4%    | 4%    | 4%    | 0%    | 0%    | 0%   | 3%    | 3%    | 3%   | 2%    | 2%    | 2%   |      |      |      |      |
| Shared Lane Traffic (%) |       |       |       |       |       |      |       |       |      |       |       |      |      |      |      |      |
| Lane Group Flow (vph)   | 0     | 27    | 27    | 0     | 37    | 0    | 16    | 843   | 0    | 1     | 1059  | 0    |      |      |      |      |
| Turn Type               | Perm  | NA    | Perm  | Perm  | NA    | Perm | NA    | Perm  | NA   | Perm  | NA    |      |      |      |      |      |
| Protected Phases        |       | 4     |       | 8     |       | 8    |       | 2     |      | 6     |       |      | 1    | 3    | 5    | 7    |
| Permitted Phases        | 4     |       | 4     | 8     |       | 8    |       | 2     |      | 6     |       |      |      |      |      |      |
| Detector Phase          | 4     | 4     | 4     | 8     | 8     | 8    |       | 2     | 2    | 6     | 6     |      |      |      |      |      |
| Switch Phase            |       |       |       |       |       |      |       |       |      |       |       |      |      |      |      |      |
| Minimum Initial (s)     | 4.0   | 4.0   | 4.0   | 4.0   | 4.0   |      | 10.0  | 10.0  |      | 10.0  | 10.0  |      | 1.0  | 1.0  | 1.0  | 1.0  |
| Minimum Split (s)       | 19.0  | 19.0  | 19.0  | 22.0  | 22.0  |      | 16.0  | 16.0  |      | 20.0  | 20.0  |      | 3.0  | 3.0  | 3.0  | 3.0  |
| Total Split (s)         | 18.0  | 18.0  | 18.0  | 18.0  | 18.0  |      | 71.0  | 71.0  |      | 71.0  | 71.0  |      | 3.0  | 3.0  | 3.0  | 3.0  |
| Total Split (%)         | 18.9% | 18.9% | 18.9% | 18.9% | 18.9% |      | 74.7% | 74.7% |      | 74.7% | 74.7% |      | 3%   | 3%   | 3%   | 3%   |
| Yellow Time (s)         | 4.0   | 4.0   | 4.0   | 4.0   | 4.0   |      | 4.0   | 4.0   |      | 4.0   | 4.0   |      | 2.0  | 2.0  | 2.0  | 2.0  |
| All-Red Time (s)        | 2.0   | 2.0   | 2.0   | 2.0   | 2.0   |      | 2.0   | 2.0   |      | 2.0   | 2.0   |      | 0.0  | 0.0  | 0.0  | 0.0  |
| Lost Time Adjust (s)    | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   |      | 0.0   | 0.0   |      | 0.0   | 0.0   |      |      |      |      |      |
| Total Lost Time (s)     | 6.0   | 6.0   | 6.0   | 6.0   | 6.0   |      | 6.0   | 6.0   |      | 6.0   | 6.0   |      |      |      |      |      |
| Lead/Lag                | Lag   | Lag   | Lag   | Lag   | Lag   |      | Lag   | Lag   |      | Lag   | Lag   |      | Lead | Lead | Lead | Lead |
| Lead-Lag Optimize?      |       |       |       |       |       |      |       |       |      |       |       |      |      |      |      |      |
| Recall Mode             | None  | None  | None  | None  | None  |      | None  | None  |      | None  | None  |      | None | None | None | None |
| Act Effct Green (s)     | 8.4   | 8.4   |       | 8.3   |       |      | 42.5  | 42.5  |      | 42.5  | 42.5  |      |      |      |      |      |
| Actuated g/C Ratio      | 0.16  | 0.16  |       | 0.16  |       |      | 0.81  | 0.81  |      | 0.81  | 0.81  |      |      |      |      |      |
| v/c Ratio               | 0.10  | 0.09  |       | 0.15  |       |      | 0.07  | 0.57  |      | 0.00  | 0.71  |      |      |      |      |      |
| Control Delay           | 30.8  | 0.6   |       | 23.3  |       |      | 5.6   | 7.7   |      | 5.0   | 11.1  |      |      |      |      |      |
| Queue Delay             | 0.0   | 0.0   |       | 0.0   |       |      | 0.0   | 0.0   |      | 0.0   | 0.0   |      |      |      |      |      |
| Total Delay             | 30.8  | 0.6   |       | 23.3  |       |      | 5.6   | 7.7   |      | 5.0   | 11.1  |      |      |      |      |      |
| LOS                     | C     | A     |       | C     |       |      | A     | A     |      | A     | B     |      |      |      |      |      |
| Approach Delay          | 15.7  |       |       | 23.3  |       |      | 7.7   |       |      | 11.1  |       |      |      |      |      |      |
| Approach LOS            | B     |       |       | C     |       |      | A     |       |      | B     |       |      |      |      |      |      |
| Queue Length 50th (ft)  | 8     | 0     |       | 6     |       |      | 1     | 128   |      | 0     | 204   |      |      |      |      |      |
| Queue Length 95th (ft)  | 40    | 0     |       | 40    |       |      | 12    | 442   |      | 2     | #782  |      |      |      |      |      |
| Internal Link Dist (ft) | 110   |       |       | 355   |       |      | 258   |       |      | 1055  |       |      |      |      |      |      |
| Turn Bay Length (ft)    |       | 50    |       |       |       |      | 125   |       |      | 100   |       |      |      |      |      |      |
| Base Capacity (vph)     | 585   | 553   |       | 499   |       |      | 263   | 1713  |      | 470   | 1725  |      |      |      |      |      |
| Starvation Cap Reductn  | 0     | 0     |       | 0     |       |      | 0     | 0     |      | 0     | 0     |      |      |      |      |      |
| Spillback Cap Reductn   | 0     | 0     |       | 0     |       |      | 0     | 0     |      | 0     | 0     |      |      |      |      |      |
| Storage Cap Reductn     | 0     | 0     |       | 0     |       |      | 0     | 0     |      | 0     | 0     |      |      |      |      |      |
| Reduced v/c Ratio       | 0.05  | 0.05  |       | 0.07  |       |      | 0.06  | 0.49  |      | 0.00  | 0.61  |      |      |      |      |      |

| Intersection Summary                                            |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|-----------------------------------------------------------------|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|
| Area Type: Other                                                |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Cycle Length: 95                                                |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Actuated Cycle Length: 52.7                                     |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Natural Cycle: 90                                               |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Control Type: Actuated-Uncoordinated                            |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Maximum v/c Ratio: 0.71                                         |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Intersection Signal Delay: 10.0                                 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Intersection Capacity Utilization 76.7%                         |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Analysis Period (min) 15                                        |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| # 95th percentile volume exceeds capacity, queue may be longer. |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Queue shown is maximum after two cycles.                        |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |



12239.00 :: Needham Street  
14: Winchester Street & Needham Street/Dedham Street

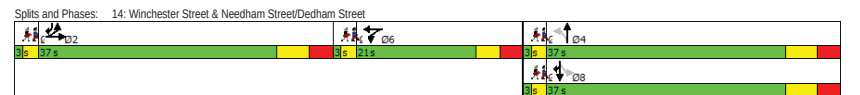
2025 Build Conditions - without Shuttle Service  
Timing Plan: Weekday Morning

| Lane Group              | EBL                                                                               | EBT                                                                               | EBR                                                                               | WBL                                                                               | WBT                                                                               | WBR                                                                               | NBL                                                                               | NBT                                                                               | NBR                                                                               | SBL                                                                               | SBT                                                                               | SBR                                                                               | Ø1   | Ø3   | Ø5   | Ø7   |
|-------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|------|------|------|------|
| Lane Configurations     |  |  |  |  |  |  |  |  |  |  |  |  |      |      |      |      |
| Traffic Volume (vph)    | 755                                                                               | 100                                                                               | 45                                                                                | 15                                                                                | 130                                                                               | 155                                                                               | 35                                                                                | 290                                                                               | 5                                                                                 | 50                                                                                | 345                                                                               | 835                                                                               |      |      |      |      |
| Future Volume (vph)     | 755                                                                               | 100                                                                               | 45                                                                                | 15                                                                                | 130                                                                               | 155                                                                               | 35                                                                                | 290                                                                               | 5                                                                                 | 50                                                                                | 345                                                                               | 835                                                                               |      |      |      |      |
| Ideal Flow (vphpl)      | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                              |      |      |      |      |
| Storage Length (ft)     | 340                                                                               |                                                                                   | 75                                                                                | 0                                                                                 |                                                                                   | 0                                                                                 | 100                                                                               |                                                                                   | 0                                                                                 |                                                                                   | 0                                                                                 |                                                                                   |      |      |      |      |
| Storage Lanes           | 1                                                                                 |                                                                                   | 1                                                                                 | 0                                                                                 |                                                                                   | 0                                                                                 | 1                                                                                 |                                                                                   | 0                                                                                 |                                                                                   | 0                                                                                 |                                                                                   |      |      |      |      |
| Taper Length (ft)       | 25                                                                                |                                                                                   |                                                                                   | 25                                                                                |                                                                                   |                                                                                   | 25                                                                                |                                                                                   |                                                                                   | 25                                                                                |                                                                                   |                                                                                   |      |      |      |      |
| Satd. Flow (prot)       | 3433                                                                              | 1761                                                                              | 0                                                                                 | 0                                                                                 | 1742                                                                              | 0                                                                                 | 1770                                                                              | 1858                                                                              | 0                                                                                 | 0                                                                                 | 1870                                                                              | 1599                                                                              |      |      |      |      |
| Flt Permitted           | 0.950                                                                             |                                                                                   |                                                                                   |                                                                                   | 0.998                                                                             |                                                                                   | 0.295                                                                             |                                                                                   |                                                                                   |                                                                                   | 0.810                                                                             |                                                                                   |      |      |      |      |
| Satd. Flow (perm)       | 3389                                                                              | 1761                                                                              | 0                                                                                 | 0                                                                                 | 1741                                                                              | 0                                                                                 | 550                                                                               | 1858                                                                              | 0                                                                                 | 0                                                                                 | 1524                                                                              | 1599                                                                              |      |      |      |      |
| Right Turn on Red       |                                                                                   |                                                                                   | Yes                                                                               |                                                                                   |                                                                                   | Yes                                                                               |                                                                                   |                                                                                   | No                                                                                |                                                                                   |                                                                                   | Yes                                                                               |      |      |      |      |
| Satd. Flow (RTOR)       |                                                                                   | 22                                                                                |                                                                                   |                                                                                   | 43                                                                                |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   | 414                                                                               |      |      |      |      |
| Link Speed (mph)        |                                                                                   | 30                                                                                |                                                                                   |                                                                                   | 30                                                                                |                                                                                   |                                                                                   | 30                                                                                |                                                                                   |                                                                                   | 30                                                                                |                                                                                   |      |      |      |      |
| Link Distance (ft)      |                                                                                   | 1135                                                                              |                                                                                   |                                                                                   | 451                                                                               |                                                                                   |                                                                                   | 634                                                                               |                                                                                   |                                                                                   | 722                                                                               |                                                                                   |      |      |      |      |
| Travel Time (s)         |                                                                                   | 25.8                                                                              |                                                                                   |                                                                                   | 10.3                                                                              |                                                                                   |                                                                                   | 14.4                                                                              |                                                                                   |                                                                                   | 16.4                                                                              |                                                                                   |      |      |      |      |
| Confl. Peds. (#/hr)     | 5                                                                                 |                                                                                   | 1                                                                                 | 1                                                                                 |                                                                                   | 5                                                                                 |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |      |      |      |      |
| Confl. Bikes (#/hr)     |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   | 1                                                                                 |                                                                                   |                                                                                   |                                                                                   |                                                                                   |      |      |      |      |
| Peak Hour Factor        | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              |      |      |      |      |
| Heavy Vehicles (%)      | 2%                                                                                | 2%                                                                                | 2%                                                                                | 0%                                                                                | 0%                                                                                | 0%                                                                                | 2%                                                                                | 2%                                                                                | 2%                                                                                | 1%                                                                                | 1%                                                                                | 1%                                                                                |      |      |      |      |
| Shared Lane Traffic (%) |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |      |      |      |      |
| Lane Group Flow (vph)   | 821                                                                               | 158                                                                               | 0                                                                                 | 0                                                                                 | 325                                                                               | 0                                                                                 | 38                                                                                | 320                                                                               | 0                                                                                 | 0                                                                                 | 429                                                                               | 908                                                                               |      |      |      |      |
| Turn Type               | Split                                                                             | NA                                                                                |                                                                                   | Split                                                                             | NA                                                                                |                                                                                   | Perm                                                                              | NA                                                                                |                                                                                   | Perm                                                                              | NA                                                                                | pt+ov                                                                             |      |      |      |      |
| Protected Phases        | 2                                                                                 | 2                                                                                 |                                                                                   | 6                                                                                 | 6                                                                                 |                                                                                   |                                                                                   | 4                                                                                 |                                                                                   |                                                                                   | 8                                                                                 | 2 8                                                                               | 1    | 3    | 5    | 7    |
| Permitted Phases        |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   | 4                                                                                 |                                                                                   |                                                                                   | 8                                                                                 |                                                                                   |                                                                                   |      |      |      |      |
| Detector Phase          | 2                                                                                 | 2                                                                                 |                                                                                   | 6                                                                                 | 6                                                                                 |                                                                                   | 4                                                                                 | 4                                                                                 |                                                                                   | 8                                                                                 | 8                                                                                 | 2 8                                                                               |      |      |      |      |
| Switch Phase            |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |      |      |      |      |
| Minimum Initial (s)     | 10.0                                                                              | 10.0                                                                              |                                                                                   | 6.0                                                                               | 6.0                                                                               |                                                                                   | 6.0                                                                               | 6.0                                                                               |                                                                                   | 6.0                                                                               | 6.0                                                                               |                                                                                   | 1.0  | 1.0  | 1.0  | 1.0  |
| Minimum Split (s)       | 17.0                                                                              | 17.0                                                                              |                                                                                   | 19.0                                                                              | 19.0                                                                              |                                                                                   | 20.0                                                                              | 20.0                                                                              |                                                                                   | 36.0                                                                              | 36.0                                                                              |                                                                                   | 3.0  | 3.0  | 3.0  | 3.0  |
| Total Split (s)         | 37.0                                                                              | 37.0                                                                              |                                                                                   | 21.0                                                                              | 21.0                                                                              |                                                                                   | 37.0                                                                              | 37.0                                                                              |                                                                                   | 37.0                                                                              | 37.0                                                                              |                                                                                   | 3.0  | 3.0  | 3.0  | 3.0  |
| Total Split (%)         | 35.6%                                                                             | 35.6%                                                                             |                                                                                   | 20.2%                                                                             | 20.2%                                                                             |                                                                                   | 35.6%                                                                             | 35.6%                                                                             |                                                                                   | 35.6%                                                                             | 35.6%                                                                             |                                                                                   | 3%   | 3%   | 3%   | 3%   |
| Yellow Time (s)         | 4.0                                                                               | 4.0                                                                               |                                                                                   | 3.0                                                                               | 3.0                                                                               |                                                                                   | 4.0                                                                               | 4.0                                                                               |                                                                                   | 4.0                                                                               | 4.0                                                                               |                                                                                   | 2.0  | 2.0  | 2.0  | 2.0  |
| All-Red Time (s)        | 3.0                                                                               | 3.0                                                                               |                                                                                   | 3.0                                                                               | 3.0                                                                               |                                                                                   | 3.0                                                                               | 3.0                                                                               |                                                                                   | 3.0                                                                               | 3.0                                                                               |                                                                                   | 0.0  | 0.0  | 0.0  | 0.0  |
| Lost Time Adjust (s)    | 0.0                                                                               | 0.0                                                                               |                                                                                   | 0.0                                                                               | 0.0                                                                               |                                                                                   | 0.0                                                                               | 0.0                                                                               |                                                                                   | 0.0                                                                               | 0.0                                                                               |                                                                                   |      |      |      |      |
| Total Lost Time (s)     | 7.0                                                                               | 7.0                                                                               |                                                                                   | 6.0                                                                               | 6.0                                                                               |                                                                                   | 7.0                                                                               | 7.0                                                                               |                                                                                   | 7.0                                                                               | 7.0                                                                               |                                                                                   |      |      |      |      |
| Lead/Lag                | Lag                                                                               | Lag                                                                               |                                                                                   | Lag                                                                               | Lag                                                                               |                                                                                   | Lag                                                                               | Lag                                                                               |                                                                                   | Lag                                                                               | Lag                                                                               |                                                                                   | Lead | Lead | Lead | Lead |
| Lead-Lag Optimize?      |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |      |      |      |      |
| Recall Mode             | None                                                                              | None                                                                              |                                                                                   | None                                                                              | None                                                                              |                                                                                   | None                                                                              | None                                                                              |                                                                                   | None                                                                              | None                                                                              |                                                                                   | None | None | None | None |
| Act Effct Green (s)     | 28.8                                                                              | 28.8                                                                              |                                                                                   | 15.0                                                                              | 15.0                                                                              |                                                                                   | 29.9                                                                              | 29.9                                                                              |                                                                                   | 30.5                                                                              | 65.0                                                                              |                                                                                   |      |      |      |      |
| Actuated g/C Ratio      | 0.30                                                                              | 0.30                                                                              |                                                                                   | 0.16                                                                              | 0.31                                                                              |                                                                                   | 0.31                                                                              | 0.31                                                                              |                                                                                   | 0.32                                                                              | 0.68                                                                              |                                                                                   |      |      |      |      |
| v/c Ratio               | 0.79                                                                              | 0.29                                                                              |                                                                                   | 1.05                                                                              | 0.22                                                                              |                                                                                   | 0.55                                                                              | 0.55                                                                              |                                                                                   | 0.88                                                                              | 0.74                                                                              |                                                                                   |      |      |      |      |
| Control Delay           | 37.5                                                                              | 23.9                                                                              |                                                                                   | 100.4                                                                             | 30.2                                                                              |                                                                                   | 32.4                                                                              | 32.4                                                                              |                                                                                   | 53.0                                                                              | 9.4                                                                               |                                                                                   |      |      |      |      |
| Queue Delay             | 0.0                                                                               | 0.0                                                                               |                                                                                   | 0.0                                                                               | 0.0                                                                               |                                                                                   | 0.0                                                                               | 0.0                                                                               |                                                                                   | 0.0                                                                               | 0.0                                                                               |                                                                                   |      |      |      |      |
| Total Delay             | 37.5                                                                              | 23.9                                                                              |                                                                                   | 100.4                                                                             | 30.2                                                                              |                                                                                   | 32.4                                                                              | 32.4                                                                              |                                                                                   | 53.0                                                                              | 9.4                                                                               |                                                                                   |      |      |      |      |
| LOS                     | D                                                                                 | C                                                                                 |                                                                                   | F                                                                                 | F                                                                                 |                                                                                   | C                                                                                 | C                                                                                 |                                                                                   | D                                                                                 | A                                                                                 |                                                                                   |      |      |      |      |
| Approach Delay          |                                                                                   | 35.3                                                                              |                                                                                   |                                                                                   | 100.4                                                                             |                                                                                   |                                                                                   | 32.2                                                                              |                                                                                   |                                                                                   | 23.4                                                                              |                                                                                   |      |      |      |      |
| Approach LOS            |                                                                                   | D                                                                                 |                                                                                   |                                                                                   | F                                                                                 |                                                                                   |                                                                                   | C                                                                                 |                                                                                   |                                                                                   | C                                                                                 |                                                                                   |      |      |      |      |
| Queue Length 50th (ft)  | 227                                                                               | 60                                                                                |                                                                                   |                                                                                   | ~191                                                                              |                                                                                   | 17                                                                                | 159                                                                               |                                                                                   | 245                                                                               | 136                                                                               |                                                                                   |      |      |      |      |
| Queue Length 95th (ft)  | 334                                                                               | 124                                                                               |                                                                                   |                                                                                   | #399                                                                              |                                                                                   | 49                                                                                | 276                                                                               |                                                                                   | #454                                                                              | 305                                                                               |                                                                                   |      |      |      |      |
| Internal Link Dist (ft) |                                                                                   | 1055                                                                              |                                                                                   |                                                                                   | 371                                                                               |                                                                                   |                                                                                   | 554                                                                               |                                                                                   |                                                                                   | 642                                                                               |                                                                                   |      |      |      |      |
| Turn Bay Length (ft)    | 340                                                                               |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   | 100                                                                               |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |      |      |      |      |
| Base Capacity (vph)     | 1080                                                                              | 569                                                                               |                                                                                   |                                                                                   | 310                                                                               |                                                                                   | 172                                                                               | 584                                                                               |                                                                                   | 486                                                                               | 1236                                                                              |                                                                                   |      |      |      |      |
| Starvation Cap Reductn  | 0                                                                                 | 0                                                                                 |                                                                                   |                                                                                   | 0                                                                                 |                                                                                   | 0                                                                                 | 0                                                                                 |                                                                                   | 0                                                                                 | 0                                                                                 |                                                                                   |      |      |      |      |
| Spillback Cap Reductn   | 0                                                                                 | 0                                                                                 |                                                                                   |                                                                                   | 0                                                                                 |                                                                                   | 0                                                                                 | 0                                                                                 |                                                                                   | 0                                                                                 | 0                                                                                 |                                                                                   |      |      |      |      |
| Storage Cap Reductn     | 0                                                                                 | 0                                                                                 |                                                                                   |                                                                                   | 0                                                                                 |                                                                                   | 0                                                                                 | 0                                                                                 |                                                                                   | 0                                                                                 | 0                                                                                 |                                                                                   |      |      |      |      |
| Reduced v/c Ratio       | 0.76                                                                              | 0.28                                                                              |                                                                                   |                                                                                   | 1.05                                                                              |                                                                                   | 0.22                                                                              | 0.55                                                                              |                                                                                   | 0.88                                                                              | 0.73                                                                              |                                                                                   |      |      |      |      |

| Intersection Summary                                            |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|-----------------------------------------------------------------|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|
| Area Type: Other                                                |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Cycle Length: 104                                               |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Actuated Cycle Length: 95.5                                     |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Natural Cycle: 85                                               |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Control Type: Actuated-Uncoordinated                            |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Maximum v/c Ratio: 1.05                                         |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Intersection Signal Delay: 36.7                                 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Intersection Capacity Utilization 101.4%                        |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Analysis Period (min) 15                                        |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| - Volume exceeds capacity, queue is theoretically infinite.     |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Queue shown is maximum after two cycles.                        |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| # 95th percentile volume exceeds capacity, queue may be longer. |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Queue shown is maximum after two cycles.                        |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |

12239.00 :: Needham Street  
14: Winchester Street & Needham Street/Dedham Street

2025 Build Conditions - without Shuttle Service  
Timing Plan: Weekday Morning



12239.00 :: Needham Street

15: Winchester Street &amp; Route 9 EB Access Road

2025 Build Conditions - without Shuttle Service

Timing Plan: Weekday Morning

| Lane Group              | WBL   | WBR    | NBT   | NBR    | SBL      | SBT   | Ø2   | Ø3   | Ø4   | Ø5   | Ø6   |
|-------------------------|-------|--------|-------|--------|----------|-------|------|------|------|------|------|
| Lane Configurations     | ↰     | ↱      | ↰     | ↱      | ↰        | ↱     |      |      |      |      |      |
| Traffic Volume (vph)    | 55    | 285    | 1035  | 220    | 65       | 1230  |      |      |      |      |      |
| Future Volume (vph)     | 55    | 285    | 1035  | 220    | 65       | 1230  |      |      |      |      |      |
| Ideal Flow (vphpl)      | 1900  | 1900   | 1900  | 1900   | 1900     | 1900  |      |      |      |      |      |
| Storage Length (ft)     | 200   | 0      |       | 100    | 0        |       |      |      |      |      |      |
| Storage Lanes           | 1     | 1      |       | 1      | 1        |       |      |      |      |      |      |
| Taper Length (ft)       | 25    |        |       |        | 25       |       |      |      |      |      |      |
| Satd. Flow (prot)       | 1787  | 1599   | 1881  | 1599   | 1787     | 1881  |      |      |      |      |      |
| Flt Permitted           | 0.950 |        |       |        | 0.073    |       |      |      |      |      |      |
| Satd. Flow (perm)       | 1787  | 1599   | 1881  | 1508   | 137      | 1881  |      |      |      |      |      |
| Right Turn on Red       |       | Yes    |       | Yes    |          |       |      |      |      |      |      |
| Satd. Flow (RTOR)       |       | 110    |       | 51     |          |       |      |      |      |      |      |
| Link Speed (mph)        | 30    |        | 30    |        | 30       |       |      |      |      |      |      |
| Link Distance (ft)      | 443   |        | 400   |        | 252      |       |      |      |      |      |      |
| Travel Time (s)         | 10.1  |        | 9.1   |        | 5.7      |       |      |      |      |      |      |
| Confl. Peds. (#/hr)     |       |        |       | 9      | 9        |       |      |      |      |      |      |
| Peak Hour Factor        | 0.92  | 0.92   | 0.92  | 0.92   | 0.92     | 0.92  |      |      |      |      |      |
| Heavy Vehicles (%)      | 1%    | 1%     | 1%    | 1%     | 1%       | 1%    |      |      |      |      |      |
| Shared Lane Traffic (%) |       |        |       |        |          |       |      |      |      |      |      |
| Lane Group Flow (vph)   | 60    | 310    | 1125  | 239    | 71       | 1337  |      |      |      |      |      |
| Turn Type               | Prot  | custom | NA    | custom | NA       |       |      |      |      |      |      |
| Protected Phases        | 5 6   | 1 5 6  | 2 3   | 5 6    | 1 12 3 4 | 2     | 3    | 4    | 5    | 6    |      |
| Permitted Phases        |       |        |       | 2      | 2        |       |      |      |      |      |      |
| Detector Phase          | 5 6   | 1 5 6  | 2 3   | 5 6    | 1 12 3 4 |       |      |      |      |      |      |
| Switch Phase            |       |        |       |        |          |       |      |      |      |      |      |
| Minimum Initial (s)     |       |        |       |        | 4.0      |       | 10.0 | 10.0 | 4.0  | 4.0  |      |
| Minimum Split (s)       |       |        |       |        | 10.0     |       | 25.0 | 27.0 | 10.0 | 11.0 | 9.0  |
| Total Split (s)         |       |        |       |        | 23.0     |       | 61.0 | 28.0 | 10.0 | 27.0 | 9.0  |
| Total Split (%)         |       |        |       |        | 14.6%    |       | 39%  | 18%  | 6%   | 17%  | 6%   |
| Yellow Time (s)         |       |        |       |        | 4.0      |       | 4.0  | 4.0  | 4.0  | 3.0  | 3.0  |
| All-Red Time (s)        |       |        |       |        | 2.0      |       | 2.0  | 2.0  | 2.0  | 4.0  | 2.0  |
| Lost Time Adjust (s)    |       |        |       |        | 0.0      |       |      |      |      |      |      |
| Total Lost Time (s)     |       |        |       |        | 6.0      |       |      |      |      |      |      |
| Lead/Lag                |       |        |       |        | Lead     |       | Lag  | Lead | Lag  | Lead | Lag  |
| Lead-Lag Optimize?      |       |        |       |        | None     |       | None | None | None | None | None |
| Recall Mode             |       |        |       |        | None     |       | None | None | None | None | None |
| Act Effct Green (s)     | 29.0  | 53.0   | 83.0  | 83.0   | 72.0     | 116.0 |      |      |      |      |      |
| Actuated g/C Ratio      | 0.18  | 0.34   | 0.53  | 0.53   | 0.46     | 0.73  |      |      |      |      |      |
| v/c Ratio               | 0.18  | 0.51   | 1.14  | 0.29   | 0.30     | 0.97  |      |      |      |      |      |
| Control Delay           | 56.3  | 29.6   | 110.1 | 9.3    | 32.9     | 16.2  |      |      |      |      |      |
| Queue Delay             | 0.0   | 4.7    | 0.6   | 0.0    | 0.0      | 42.5  |      |      |      |      |      |
| Total Delay             | 56.3  | 34.4   | 110.6 | 9.3    | 32.9     | 58.8  |      |      |      |      |      |
| LOS                     | E     | C      | F     | A      | C        | E     |      |      |      |      |      |
| Approach Delay          | 37.9  |        | 92.9  |        |          | 57.5  |      |      |      |      |      |
| Approach LOS            | D     |        | F     |        |          | E     |      |      |      |      |      |
| Queue Length 50th (ft)  | 53    | 165    | ~1350 | 58     | 39       | 325   |      |      |      |      |      |
| Queue Length 95th (ft)  | 99    | 263    | #1615 | 90     | m31      | m180  |      |      |      |      |      |
| Internal Link Dist (ft) | 363   |        | 320   |        |          | 172   |      |      |      |      |      |
| Turn Bay Length (ft)    | 200   |        |       | 100    |          |       |      |      |      |      |      |
| Base Capacity (vph)     | 327   | 609    | 988   | 833    | 239      | 1380  |      |      |      |      |      |
| Starvation Cap Reductn  | 0     | 0      | 19    | 0      | 0        | 383   |      |      |      |      |      |
| Spillback Cap Reductn   | 0     | 226    | 102   | 0      | 0        | 0     |      |      |      |      |      |
| Storage Cap Reductn     | 0     | 0      | 0     | 0      | 0        | 0     |      |      |      |      |      |
| Reduced v/c Ratio       | 0.18  | 0.81   | 1.27  | 0.29   | 0.30     | 1.34  |      |      |      |      |      |

## Intersection Summary

Area Type: Other

Cycle Length: 158

Actuated Cycle Length: 158

Natural Cycle: 145

Control Type: Actuated-Uncoordinated

Maximum v/c Ratio: 1.32

Intersection Signal Delay: 70.5

Intersection LOS: E

Intersection Capacity Utilization 82.1%

ICU Level of Service E

Analysis Period (min) 15

- Volume exceeds capacity, queue is theoretically infinite.

- Queue shown is maximum after two cycles.

# 95th percentile volume exceeds capacity, queue may be longer.

- Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

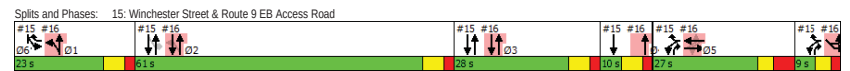
Lanes, Volumes, Timings  
VHB/MSD\\vhb\proj\Wat-LD\12239.00\tech\Traffic\Synchro\TIA\_2018\2025 BD\_AM\_CONSERVATIVE.syn  
07/03/2018

12239.00 :: Needham Street

15: Winchester Street &amp; Route 9 EB Access Road

2025 Build Conditions - without Shuttle Service

Timing Plan: Weekday Morning

Lanes, Volumes, Timings  
VHB/MSD\\vhb\proj\Wat-LD\12239.00\tech\Traffic\Synchro\TIA\_2018\2025 BD\_AM\_CONSERVATIVE.syn  
07/03/2018



12239.00 :: Needham Street  
17: Centre Street & Walnut Street

2025 Build Conditions - without Shuttle Service  
Timing Plan: Weekday Morning

| Lane Group                                                      | SEL                    | SET   | SER   | NWL   | NWT   | NWR  | NEL   | NET  | NER   | SWL   | SWT  | SWR  | Ø3 |
|-----------------------------------------------------------------|------------------------|-------|-------|-------|-------|------|-------|------|-------|-------|------|------|----|
| Lane Configurations                                             |                        |       |       |       |       |      |       |      |       |       |      |      |    |
| Traffic Volume (vph)                                            | 20                     | 1     | 405   | 35    | 40    | 0    | 400   | 705  | 2     | 1     | 735  | 30   |    |
| Future Volume (vph)                                             | 20                     | 1     | 405   | 35    | 40    | 0    | 400   | 705  | 2     | 1     | 735  | 30   |    |
| Ideal Flow (vphpl)                                              | 1900                   | 1900  | 1900  | 1900  | 1900  | 1900 | 1900  | 1900 | 1900  | 1900  | 1900 | 1900 |    |
| Storage Length (ft)                                             | 0                      |       | 50    | 0     |       | 0    | 75    | 0    |       | 0     | 0    | 0    |    |
| Storage Lanes                                                   | 0                      |       | 1     | 0     |       | 0    | 1     | 0    |       | 0     | 0    | 0    |    |
| Taper Length (ft)                                               | 25                     |       |       | 25    |       |      | 25    |      |       | 25    |      |      |    |
| Satd. Flow (prot)                                               | 0                      | 1813  | 1615  | 0     | 1856  | 0    | 1770  | 1863 | 0     | 0     | 1889 | 0    |    |
| Flt Permitted                                                   |                        | 0.745 |       |       | 0.839 |      | 0.179 |      |       |       |      |      |    |
| Satd. Flow (perm)                                               | 0                      | 1346  | 1573  | 0     | 1583  | 0    | 333   | 1863 | 0     | 0     | 1889 | 0    |    |
| Right Turn on Red                                               |                        |       | No    |       | No    |      |       |      | Yes   |       | Yes  |      |    |
| Satd. Flow (RTOR)                                               |                        |       |       |       |       |      |       |      |       | 2     |      |      |    |
| Link Speed (mph)                                                |                        | 30    |       |       | 30    |      |       | 30   |       |       | 30   |      |    |
| Link Distance (ft)                                              |                        | 624   |       |       | 387   |      |       | 508  |       |       | 531  |      |    |
| Travel Time (s)                                                 |                        | 14.2  |       |       | 8.8   |      |       | 11.5 |       |       | 12.1 |      |    |
| Confl. Peds. (#/hr)                                             | 17                     |       | 4     | 4     |       | 17   | 3     |      | 9     | 9     |      | 3    |    |
| Peak Hour Factor                                                | 0.92                   | 0.92  | 0.92  | 0.92  | 0.92  | 0.92 | 0.92  | 0.92 | 0.92  | 0.92  | 0.92 | 0.92 |    |
| Heavy Vehicles (%)                                              | 0%                     | 0%    | 0%    | 0%    | 0%    | 0%   | 2%    | 2%   | 2%    | 0%    | 0%   | 0%   |    |
| Shared Lane Traffic (%)                                         |                        |       |       |       |       |      |       |      |       |       |      |      |    |
| Lane Group Flow (vph)                                           | 0                      | 23    | 440   | 0     | 81    | 0    | 435   | 768  | 0     | 0     | 833  | 0    |    |
| Turn Type                                                       | Perm                   | NA    | pm+ov | Perm  | NA    |      | D,P+P | NA   |       | Perm  | NA   |      |    |
| Protected Phases                                                |                        | 4     | 1     |       | 4     |      | 1     | 1.2  |       |       | 2    |      | 3  |
| Permitted Phases                                                |                        | 4     |       | 4     |       |      | 2     |      |       | 2     |      |      |    |
| Detector Phase                                                  | 4                      | 4     | 1     | 4     | 4     |      | 1     | 1.2  |       | 2     | 2    |      |    |
| Switch Phase                                                    |                        |       |       |       |       |      |       |      |       |       |      |      |    |
| Minimum Initial (s)                                             | 9.0                    | 9.0   | 7.0   | 9.0   | 9.0   |      | 7.0   |      | 6.0   | 6.0   |      | 4.0  |    |
| Minimum Split (s)                                               | 14.0                   | 14.0  | 12.0  | 14.0  | 14.0  |      | 12.0  |      | 11.0  | 11.0  |      | 19.0 |    |
| Total Split (s)                                                 | 19.0                   | 19.0  | 25.0  | 19.0  | 19.0  |      | 25.0  |      | 45.0  | 45.0  |      | 19.0 |    |
| Total Split (%)                                                 | 17.6%                  | 17.6% | 23.1% | 17.6% | 17.6% |      | 23.1% |      | 41.7% | 41.7% |      | 18%  |    |
| Yellow Time (s)                                                 | 4.0                    | 4.0   | 4.0   | 4.0   | 4.0   |      | 4.0   |      | 4.0   | 4.0   |      | 4.0  |    |
| All-Red Time (s)                                                | 1.0                    | 1.0   | 1.0   | 1.0   | 1.0   |      | 1.0   |      | 1.0   | 1.0   |      | 0.0  |    |
| Lost Time Adjust (s)                                            |                        | 0.0   | 0.0   |       | 0.0   |      | 0.0   |      |       |       | 0.0  |      |    |
| Total Lost Time (s)                                             |                        | 5.0   | 5.0   |       | 5.0   |      | 5.0   |      |       |       | 5.0  |      |    |
| Lead/Lag                                                        | Lag                    | Lag   | Lead  | Lag   | Lag   | Lead |       |      | Lag   | Lag   | Lead |      |    |
| Lead-Lag Optimize?                                              |                        |       |       |       |       |      |       |      |       |       |      |      |    |
| Recall Mode                                                     | Min                    | Min   | Max   | Min   | Min   | Max  |       |      | Max   | Max   |      | None |    |
| Act Effct Green (s)                                             | 10.6                   | 30.8  |       | 10.6  |       | 60.8 | 65.8  |      |       | 40.5  |      |      |    |
| Actuated g/C Ratio                                              | 0.11                   | 0.32  |       | 0.11  |       | 0.63 | 0.68  |      |       | 0.42  |      |      |    |
| v/c Ratio                                                       | 0.16                   | 0.87  |       | 0.47  |       | 0.86 | 0.61  |      |       | 1.06  |      |      |    |
| Control Delay                                                   | 44.7                   | 49.7  |       | 52.5  |       | 37.7 | 13.5  |      |       | 78.2  |      |      |    |
| Queue Delay                                                     | 0.0                    | 0.0   |       | 0.0   |       | 0.0  | 1.7   |      |       | 0.0   |      |      |    |
| Total Delay                                                     | 44.7                   | 49.7  |       | 52.5  |       | 37.7 | 15.1  |      |       | 78.2  |      |      |    |
| LOS                                                             | D                      | D     |       | D     |       | D    | B     |      |       | E     |      |      |    |
| Approach Delay                                                  | 49.5                   |       |       | 52.5  |       |      | 23.3  |      |       | 78.2  |      |      |    |
| Approach LOS                                                    | D                      |       |       | D     |       |      | C     |      |       | E     |      |      |    |
| Queue Length 50th (ft)                                          | 14                     | 265   |       | 52    |       | 188  | 296   |      |       | ~649  |      |      |    |
| Queue Length 95th (ft)                                          | 40                     | #468  |       | 101   |       | #409 | 475   |      |       | #940  |      |      |    |
| Internal Link Dist (ft)                                         | 544                    |       |       | 307   |       |      | 428   |      |       | 451   |      |      |    |
| Turn Bay Length (ft)                                            |                        | 50    |       |       |       | 75   |       |      |       |       |      |      |    |
| Base Capacity (vph)                                             | 196                    | 508   |       | 231   |       | 508  | 1264  |      |       | 789   |      |      |    |
| Starvation Cap Reductn                                          | 0                      | 0     |       | 0     |       | 0    | 314   |      |       | 0     |      |      |    |
| Spillback Cap Reductn                                           | 0                      | 0     |       | 0     |       | 0    | 0     |      |       | 0     |      |      |    |
| Storage Cap Reductn                                             | 0                      | 0     |       | 0     |       | 0    | 0     |      |       | 0     |      |      |    |
| Reduced v/c Ratio                                               | 0.12                   | 0.87  |       | 0.35  |       | 0.86 | 0.81  |      |       | 1.06  |      |      |    |
| Intersection Summary                                            |                        |       |       |       |       |      |       |      |       |       |      |      |    |
| Area Type:                                                      | Other                  |       |       |       |       |      |       |      |       |       |      |      |    |
| Cycle Length: 108                                               |                        |       |       |       |       |      |       |      |       |       |      |      |    |
| Actuated Cycle Length: 97                                       |                        |       |       |       |       |      |       |      |       |       |      |      |    |
| Natural Cycle: 110                                              |                        |       |       |       |       |      |       |      |       |       |      |      |    |
| Control Type: Semi Act-Uncoord                                  |                        |       |       |       |       |      |       |      |       |       |      |      |    |
| Maximum v/c Ratio: 1.06                                         |                        |       |       |       |       |      |       |      |       |       |      |      |    |
| Intersection Signal Delay: 46.6                                 | Intersection LOS: D    |       |       |       |       |      |       |      |       |       |      |      |    |
| Intersection Capacity Utilization 101.0%                        | ICU Level of Service G |       |       |       |       |      |       |      |       |       |      |      |    |
| Analysis Period (min) 15                                        |                        |       |       |       |       |      |       |      |       |       |      |      |    |
| - Volume exceeds capacity, queue is theoretically infinite.     |                        |       |       |       |       |      |       |      |       |       |      |      |    |
| - Queue shown is maximum after two cycles.                      |                        |       |       |       |       |      |       |      |       |       |      |      |    |
| # 95th percentile volume exceeds capacity, queue may be longer. |                        |       |       |       |       |      |       |      |       |       |      |      |    |
| - Queue shown is maximum after two cycles.                      |                        |       |       |       |       |      |       |      |       |       |      |      |    |

12239.00 :: Needham Street  
17: Centre Street & Walnut Street

2025 Build Conditions - without Shuttle Service  
Timing Plan: Weekday Morning





12239.00 :: Needham Street  
18: Nahanton Street & Winchester Street

2025 Build Conditions - without Shuttle Service  
Timing Plan: Weekday Morning

| Lane Group              | EBL                                                                               | EBT                                                                               | WBT                                                                               | WBR                                                                               | SBL                                                                               | SBR                                                                               |
|-------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|
| Lane Configurations     |  |  |  |  |  |  |
| Traffic Volume (vph)    | 260                                                                               | 535                                                                               | 715                                                                               | 30                                                                                | 40                                                                                | 345                                                                               |
| Future Volume (vph)     | 260                                                                               | 535                                                                               | 715                                                                               | 30                                                                                | 40                                                                                | 345                                                                               |
| Ideal Flow (vphpl)      | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                              |
| Storage Length (ft)     | 175                                                                               |                                                                                   |                                                                                   |                                                                                   | 75                                                                                | 0                                                                                 |
| Storage Lanes           | 1                                                                                 |                                                                                   |                                                                                   |                                                                                   | 1                                                                                 |                                                                                   |
| Taper Length (ft)       | 25                                                                                |                                                                                   |                                                                                   |                                                                                   | 25                                                                                |                                                                                   |
| Satd. Flow (prot)       | 1787                                                                              | 1881                                                                              | 1870                                                                              | 0                                                                                 | 1787                                                                              | 1599                                                                              |
| Flt Permitted           | 0.172                                                                             |                                                                                   |                                                                                   |                                                                                   | 0.950                                                                             |                                                                                   |
| Satd. Flow (perm)       | 324                                                                               | 1881                                                                              | 1870                                                                              | 0                                                                                 | 1787                                                                              | 1599                                                                              |
| Right Turn on Red       |                                                                                   |                                                                                   |                                                                                   | Yes                                                                               |                                                                                   | No                                                                                |
| Satd. Flow (RTOR)       |                                                                                   |                                                                                   | 3                                                                                 |                                                                                   |                                                                                   |                                                                                   |
| Link Speed (mph)        |                                                                                   | 30                                                                                | 30                                                                                |                                                                                   | 30                                                                                |                                                                                   |
| Link Distance (ft)      |                                                                                   | 963                                                                               | 734                                                                               |                                                                                   | 889                                                                               |                                                                                   |
| Travel Time (s)         |                                                                                   | 21.9                                                                              | 16.7                                                                              |                                                                                   | 20.2                                                                              |                                                                                   |
| Peak Hour Factor        | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              |
| Heavy Vehicles (%)      | 1%                                                                                | 1%                                                                                | 1%                                                                                | 1%                                                                                | 1%                                                                                | 1%                                                                                |
| Shared Lane Traffic (%) |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| Lane Group Flow (vph)   | 283                                                                               | 582                                                                               | 810                                                                               | 0                                                                                 | 43                                                                                | 375                                                                               |
| Turn Type               | pm+pt                                                                             | NA                                                                                | NA                                                                                |                                                                                   | Prot                                                                              | pt+ov                                                                             |
| Protected Phases        | 5                                                                                 | 2                                                                                 | 6                                                                                 |                                                                                   | 8                                                                                 | 5/8                                                                               |
| Permitted Phases        | 2                                                                                 |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| Detector Phase          | 5                                                                                 | 2                                                                                 | 6                                                                                 |                                                                                   | 8                                                                                 | 5/8                                                                               |
| Switch Phase            |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| Minimum Initial (s)     | 6.0                                                                               | 10.0                                                                              | 10.0                                                                              |                                                                                   | 6.0                                                                               |                                                                                   |
| Minimum Split (s)       | 11.0                                                                              | 15.0                                                                              | 23.0                                                                              |                                                                                   | 10.0                                                                              |                                                                                   |
| Total Split (s)         | 29.0                                                                              | 100.0                                                                             | 71.0                                                                              |                                                                                   | 15.0                                                                              |                                                                                   |
| Total Split (%)         | 25.2%                                                                             | 87.0%                                                                             | 61.7%                                                                             |                                                                                   | 13.0%                                                                             |                                                                                   |
| Yellow Time (s)         | 3.0                                                                               | 3.0                                                                               | 3.0                                                                               |                                                                                   | 3.0                                                                               |                                                                                   |
| All-Red Time (s)        | 2.0                                                                               | 2.0                                                                               | 2.0                                                                               |                                                                                   | 1.0                                                                               |                                                                                   |
| Lost Time Adjust (s)    | 0.0                                                                               | 0.0                                                                               | 0.0                                                                               |                                                                                   | 0.0                                                                               |                                                                                   |
| Total Lost Time (s)     | 5.0                                                                               | 5.0                                                                               | 5.0                                                                               |                                                                                   | 4.0                                                                               |                                                                                   |
| Lead/Lag                | Lead                                                                              |                                                                                   | Lag                                                                               |                                                                                   |                                                                                   |                                                                                   |
| Lead-Lag Optimize?      | Yes                                                                               |                                                                                   | Yes                                                                               |                                                                                   |                                                                                   |                                                                                   |
| Recall Mode             | None                                                                              | C-Min                                                                             | None                                                                              |                                                                                   | None                                                                              |                                                                                   |
| Act Effct Green (s)     | 88.8                                                                              | 88.8                                                                              | 68.3                                                                              |                                                                                   | 17.2                                                                              | 36.7                                                                              |
| Actuated g/C Ratio      | 0.77                                                                              | 0.77                                                                              | 0.59                                                                              |                                                                                   | 0.15                                                                              | 0.32                                                                              |
| v/c Ratio               | 0.63                                                                              | 0.40                                                                              | 0.73                                                                              |                                                                                   | 0.16                                                                              | 0.74                                                                              |
| Control Delay           | 12.5                                                                              | 5.1                                                                               | 22.2                                                                              |                                                                                   | 47.0                                                                              | 44.1                                                                              |
| Queue Delay             | 0.0                                                                               | 0.0                                                                               | 0.0                                                                               |                                                                                   | 0.0                                                                               | 0.0                                                                               |
| Total Delay             | 12.5                                                                              | 5.1                                                                               | 22.2                                                                              |                                                                                   | 47.0                                                                              | 44.1                                                                              |
| LOS                     | B                                                                                 | A                                                                                 | C                                                                                 |                                                                                   | D                                                                                 | D                                                                                 |
| Approach Delay          |                                                                                   | 7.5                                                                               | 22.2                                                                              |                                                                                   | 44.4                                                                              |                                                                                   |
| Approach LOS            |                                                                                   | A                                                                                 | C                                                                                 |                                                                                   | D                                                                                 |                                                                                   |
| Queue Length 50th (ft)  |                                                                                   | 57                                                                                | 142                                                                               | 399                                                                               | 27                                                                                | 248                                                                               |
| Queue Length 95th (ft)  |                                                                                   | 94                                                                                | 115                                                                               | 594                                                                               | 67                                                                                | 352                                                                               |
| Internal Link Dist (ft) |                                                                                   |                                                                                   | 883                                                                               | 654                                                                               | 809                                                                               |                                                                                   |
| Turn Bay Length (ft)    |                                                                                   | 175                                                                               |                                                                                   |                                                                                   | 75                                                                                |                                                                                   |
| Base Capacity (vph)     |                                                                                   | 555                                                                               | 1553                                                                              | 1114                                                                              | 267                                                                               | 628                                                                               |
| Starvation Cap Reductn  |                                                                                   | 0                                                                                 | 0                                                                                 | 0                                                                                 | 0                                                                                 | 0                                                                                 |
| Spillback Cap Reductn   |                                                                                   | 0                                                                                 | 0                                                                                 | 0                                                                                 | 0                                                                                 | 0                                                                                 |
| Storage Cap Reductn     |                                                                                   | 0                                                                                 | 0                                                                                 | 0                                                                                 | 0                                                                                 | 0                                                                                 |
| Reduced v/c Ratio       |                                                                                   | 0.51                                                                              | 0.37                                                                              | 0.73                                                                              | 0.16                                                                              | 0.60                                                                              |

Intersection Summary

Area Type: Other  
Cycle Length: 115  
Actuated Cycle Length: 115  
Offset: 8 (7%), Referenced to phase 2:EBTL, Start of Green  
Natural Cycle: 60  
Control Type: Actuated-Coordinated  
Maximum v/c Ratio: 0.74  
Intersection Signal Delay: 20.5  
Intersection Capacity Utilization 70.5%  
Analysis Period (min) 15

Splits and Phases: 18: Nahanton Street & Winchester Street



Lanes, Volumes, Timings  
VHB/MSD  
\\vhb\proj\Wat-LD\12239.00\tech\Traffic\Synchro\TIA\_2018\2025 BD\_AM\_CONSERVATIVE.syn  
07/03/2018

12239.00 :: Needham Street  
19: Wells Avenue/JCC Driveway & Nahanton Street

2025 Build Conditions - without Shuttle Service  
Timing Plan: Weekday Morning

| Lane Group              | EBL                                                                                 | EBT                                                                                 | EBR                                                                                 | WBL                                                                                 | WBT                                                                                 | WBR                                                                                 | NBL                                                                                 | NBT                                                                                 | NBR                                                                                 | SBL                                                                                 | SBT                                                                                 | SBR                                                                                 |
|-------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
| Lane Configurations     |  |  |  |  |  |  |  |  |  |  |  |  |
| Traffic Volume (vph)    | 65                                                                                  | 590                                                                                 | 370                                                                                 | 385                                                                                 | 515                                                                                 | 160                                                                                 | 110                                                                                 | 15                                                                                  | 140                                                                                 | 65                                                                                  | 10                                                                                  | 50                                                                                  |
| Future Volume (vph)     | 65                                                                                  | 590                                                                                 | 370                                                                                 | 385                                                                                 | 515                                                                                 | 160                                                                                 | 110                                                                                 | 15                                                                                  | 140                                                                                 | 65                                                                                  | 10                                                                                  | 50                                                                                  |
| Ideal Flow (vphpl)      | 1900                                                                                | 1900                                                                                | 1900                                                                                | 1900                                                                                | 1900                                                                                | 1900                                                                                | 1900                                                                                | 1900                                                                                | 1900                                                                                | 1900                                                                                | 1900                                                                                | 1900                                                                                |
| Storage Length (ft)     | 125                                                                                 |                                                                                     |                                                                                     | 125                                                                                 | 150                                                                                 |                                                                                     | 0                                                                                   | 0                                                                                   |                                                                                     | 0                                                                                   | 75                                                                                  | 0                                                                                   |
| Storage Lanes           | 1                                                                                   |                                                                                     |                                                                                     | 1                                                                                   |                                                                                     |                                                                                     | 0                                                                                   | 1                                                                                   |                                                                                     | 0                                                                                   | 1                                                                                   |                                                                                     |
| Taper Length (ft)       | 25                                                                                  |                                                                                     |                                                                                     | 25                                                                                  |                                                                                     |                                                                                     | 25                                                                                  |                                                                                     |                                                                                     | 25                                                                                  |                                                                                     |                                                                                     |
| Satd. Flow (prot)       | 1787                                                                                | 1881                                                                                | 1599                                                                                | 1805                                                                                | 1832                                                                                | 0                                                                                   | 1787                                                                                | 1625                                                                                | 0                                                                                   | 1805                                                                                | 1662                                                                                | 0                                                                                   |
| Flt Permitted           | 0.203                                                                               |                                                                                     |                                                                                     | 0.270                                                                               |                                                                                     |                                                                                     | 0.715                                                                               |                                                                                     |                                                                                     | 0.546                                                                               |                                                                                     |                                                                                     |
| Satd. Flow (perm)       | 382                                                                                 | 1881                                                                                | 1599                                                                                | 513                                                                                 | 1832                                                                                | 0                                                                                   | 1345                                                                                | 1625                                                                                | 0                                                                                   | 1037                                                                                | 1662                                                                                | 0                                                                                   |
| Right Turn on Red       |                                                                                     |                                                                                     | Yes                                                                                 |                                                                                     |                                                                                     | Yes                                                                                 |                                                                                     |                                                                                     | Yes                                                                                 |                                                                                     |                                                                                     | Yes                                                                                 |
| Satd. Flow (RTOR)       |                                                                                     |                                                                                     | 330                                                                                 |                                                                                     | 27                                                                                  |                                                                                     |                                                                                     | 152                                                                                 |                                                                                     |                                                                                     | 54                                                                                  |                                                                                     |
| Link Speed (mph)        |                                                                                     | 30                                                                                  |                                                                                     |                                                                                     | 30                                                                                  |                                                                                     |                                                                                     | 30                                                                                  |                                                                                     |                                                                                     | 30                                                                                  |                                                                                     |
| Link Distance (ft)      |                                                                                     | 797                                                                                 |                                                                                     |                                                                                     | 963                                                                                 |                                                                                     |                                                                                     | 598                                                                                 |                                                                                     |                                                                                     | 628                                                                                 |                                                                                     |
| Travel Time (s)         |                                                                                     | 18.1                                                                                |                                                                                     |                                                                                     | 21.9                                                                                |                                                                                     |                                                                                     | 13.6                                                                                |                                                                                     |                                                                                     | 14.3                                                                                |                                                                                     |
| Peak Hour Factor        | 0.92                                                                                | 0.92                                                                                | 0.92                                                                                | 0.92                                                                                | 0.92                                                                                | 0.92                                                                                | 0.92                                                                                | 0.92                                                                                | 0.92                                                                                | 0.92                                                                                | 0.92                                                                                | 0.92                                                                                |
| Heavy Vehicles (%)      | 1%                                                                                  | 1%                                                                                  | 1%                                                                                  | 0%                                                                                  | 0%                                                                                  | 0%                                                                                  | 1%                                                                                  | 1%                                                                                  | 1%                                                                                  | 0%                                                                                  | 0%                                                                                  | 0%                                                                                  |
| Shared Lane Traffic (%) |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Lane Group Flow (vph)   | 71                                                                                  | 641                                                                                 | 402                                                                                 | 418                                                                                 | 734                                                                                 | 0                                                                                   | 120                                                                                 | 168                                                                                 | 0                                                                                   | 71                                                                                  | 65                                                                                  | 0                                                                                   |
| Turn Type               | pm+pt                                                                               | NA                                                                                  | Perm                                                                                | pm+pt                                                                               | NA                                                                                  |                                                                                     | Perm                                                                                | NA                                                                                  |                                                                                     | Perm                                                                                | NA                                                                                  |                                                                                     |
| Protected Phases        | 3                                                                                   | 1                                                                                   |                                                                                     | 3                                                                                   | 1                                                                                   |                                                                                     |                                                                                     | 2                                                                                   |                                                                                     |                                                                                     | 2                                                                                   |                                                                                     |
| Permitted Phases        | 1                                                                                   |                                                                                     | 1                                                                                   | 1                                                                                   |                                                                                     |                                                                                     | 2                                                                                   |                                                                                     |                                                                                     | 2                                                                                   |                                                                                     |                                                                                     |
| Detector Phase          | 3                                                                                   | 1                                                                                   |                                                                                     | 3                                                                                   | 1                                                                                   |                                                                                     |                                                                                     | 2                                                                                   |                                                                                     | 2                                                                                   |                                                                                     |                                                                                     |
| Switch Phase            |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Minimum Initial (s)     | 6.0                                                                                 | 6.0                                                                                 | 6.0                                                                                 | 6.0                                                                                 | 6.0                                                                                 |                                                                                     | 6.0                                                                                 | 6.0                                                                                 |                                                                                     | 6.0                                                                                 | 6.0                                                                                 |                                                                                     |
| Minimum Split (s)       | 10.0                                                                                | 11.0                                                                                | 11.0                                                                                | 10.0                                                                                | 11.0                                                                                |                                                                                     | 11.0                                                                                | 11.0                                                                                |                                                                                     | 11.0                                                                                | 11.0                                                                                |                                                                                     |
| Total Split (s)         | 16.0                                                                                | 55.0                                                                                | 55.0                                                                                | 16.0                                                                                | 55.0                                                                                |                                                                                     | 20.0                                                                                | 20.0                                                                                |                                                                                     | 20.0                                                                                | 20.0                                                                                |                                                                                     |
| Total Split (%)         | 17.6%                                                                               | 60.4%                                                                               | 60.4%                                                                               | 17.6%                                                                               | 60.4%                                                                               |                                                                                     | 22.0%                                                                               | 22.0%                                                                               |                                                                                     | 22.0%                                                                               | 22.0%                                                                               |                                                                                     |
| Yellow Time (s)         | 3.0                                                                                 | 3.0                                                                                 | 3.0                                                                                 | 3.0                                                                                 | 3.0                                                                                 |                                                                                     | 3.0                                                                                 | 3.0                                                                                 |                                                                                     | 3.0                                                                                 | 3.0                                                                                 |                                                                                     |
| All-Red Time (s)        | 1.0                                                                                 | 2.0                                                                                 | 2.0                                                                                 | 1.0                                                                                 | 2.0                                                                                 |                                                                                     | 2.0                                                                                 | 2.0                                                                                 |                                                                                     | 2.0                                                                                 | 2.0                                                                                 |                                                                                     |
| Lost Time Adjust (s)    | 0.0                                                                                 | 0.0                                                                                 | 0.0                                                                                 | 0.0                                                                                 | 0.0                                                                                 |                                                                                     | 0.0                                                                                 | 0.0                                                                                 |                                                                                     | 0.0                                                                                 | 0.0                                                                                 |                                                                                     |
| Total Lost Time (s)     | 4.0                                                                                 | 5.0                                                                                 | 5.0                                                                                 | 4.0                                                                                 | 5.0                                                                                 |                                                                                     | 5.0                                                                                 | 5.0                                                                                 |                                                                                     | 5.0                                                                                 | 5.0                                                                                 |                                                                                     |
| Lead/Lag                | Lead                                                                                |                                                                                     | Lead                                                                                |                                                                                     | Lead                                                                                |                                                                                     | Lag                                                                                 | Lag                                                                                 |                                                                                     | Lag                                                                                 | Lag                                                                                 |                                                                                     |
| Lead-Lag Optimize?      |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Recall Mode             | None                                                                                | None                                                                                | None                                                                                | None                                                                                | None                                                                                |                                                                                     | None                                                                                | None                                                                                |                                                                                     | None                                                                                | None                                                                                |                                                                                     |
| Act Effct Green (s)     | 53.1                                                                                | 41.3                                                                                | 41.3                                                                                | 53.1                                                                                | 41.3                                                                                |                                                                                     | 11.1                                                                                | 11.1                                                                                |                                                                                     | 11.1                                                                                | 11.1                                                                                |                                                                                     |
| Actuated g/C Ratio      | 0.68                                                                                | 0.53                                                                                | 0.53                                                                                | 0.68                                                                                | 0.53                                                                                |                                                                                     | 0.14                                                                                | 0.14                                                                                |                                                                                     | 0.14                                                                                | 0.14                                                                                |                                                                                     |
| v/c Ratio               | 0.16                                                                                | 0.64                                                                                | 0.40                                                                                | 0.79                                                                                | 0.75                                                                                |                                                                                     | 0.63                                                                                | 0.47                                                                                |                                                                                     | 0.48                                                                                | 0.23                                                                                |                                                                                     |
| Control Delay           | 4.0                                                                                 | 16.7                                                                                | 3.6                                                                                 | 18.8                                                                                | 19.4                                                                                |                                                                                     | 50.1                                                                                | 12.6                                                                                |                                                                                     | 45.7                                                                                | 14.8                                                                                |                                                                                     |
| Queue Delay             | 0.0                                                                                 | 0.0                                                                                 | 0.0                                                                                 | 0.0                                                                                 | 0.0                                                                                 |                                                                                     | 0.0                                                                                 | 0.0                                                                                 |                                                                                     | 0.0                                                                                 | 0.0                                                                                 |                                                                                     |
| Total Delay             | 4.0                                                                                 | 16.7                                                                                | 3.6                                                                                 | 18.8                                                                                | 19.4                                                                                |                                                                                     | 50.1                                                                                | 12.6                                                                                |                                                                                     | 45.7                                                                                | 14.8                                                                                |                                                                                     |
| LOS                     | A                                                                                   | B                                                                                   | A                                                                                   | B                                                                                   | B                                                                                   |                                                                                     | D                                                                                   | B                                                                                   |                                                                                     | D                                                                                   | B                                                                                   |                                                                                     |
| Approach Delay          |                                                                                     | 11.1                                                                                |                                                                                     |                                                                                     | 19.1                                                                                |                                                                                     |                                                                                     | 28.2                                                                                |                                                                                     |                                                                                     | 30.9                                                                                |                                                                                     |
| Approach LOS            |                                                                                     | B                                                                                   |                                                                                     |                                                                                     | B                                                                                   |                                                                                     |                                                                                     | C                                                                                   |                                                                                     |                                                                                     | C                                                                                   |                                                                                     |
| Queue Length 50th (ft)  |                                                                                     | 8                                                                                   | 215                                                                                 | 17                                                                                  | 57                                                                                  | 259                                                                                 |                                                                                     | 64                                                                                  |                                                                                     | 8                                                                                   | 37                                                                                  |                                                                                     |
| Queue Length 95th (ft)  |                                                                                     | 19                                                                                  | 349                                                                                 | 61                                                                                  | #133                                                                                | 428                                                                                 |                                                                                     | 121                                                                                 |                                                                                     | 63                                                                                  | 80                                                                                  |                                                                                     |
| Internal Link Dist (ft) |                                                                                     |                                                                                     | 717                                                                                 |                                                                                     | 883                                                                                 |                                                                                     |                                                                                     | 518                                                                                 |                                                                                     |                                                                                     | 548                                                                                 |                                                                                     |
| Turn Bay Length (ft)    |                                                                                     | 125                                                                                 |                                                                                     | 125                                                                                 | 150                                                                                 |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     | 75                                                                                  |                                                                                     |
| Base Capacity (vph)     |                                                                                     | 497                                                                                 | 1272                                                                                | 1188                                                                                | 571                                                                                 | 1248                                                                                |                                                                                     | 272                                                                                 | 450                                                                                 |                                                                                     | 210                                                                                 | 380                                                                                 |
| Starvation Cap Reductn  |                                                                                     | 0                                                                                   | 0                                                                                   | 0                                                                                   | 0                                                                                   | 0                                                                                   |                                                                                     | 0                                                                                   | 0                                                                                   |                                                                                     | 0                                                                                   | 0                                                                                   |
| Spillback Cap Reductn   |                                                                                     | 0                                                                                   | 0                                                                                   | 0                                                                                   | 0                                                                                   | 0                                                                                   |                                                                                     | 0                                                                                   | 0                                                                                   |                                                                                     | 0                                                                                   | 0                                                                                   |
| Storage Cap Reductn     |                                                                                     | 0                                                                                   | 0                                                                                   | 0                                                                                   | 0                                                                                   | 0                                                                                   |                                                                                     | 0                                                                                   | 0                                                                                   |                                                                                     | 0                                                                                   | 0                                                                                   |
| Reduced v/c Ratio       |                                                                                     | 0.14                                                                                | 0.50                                                                                | 0.34                                                                                | 0.73                                                                                | 0.59                                                                                |                                                                                     | 0.44                                                                                | 0.37                                                                                |                                                                                     | 0.34                                                                                | 0.17                                                                                |

Intersection Summary

Area Type: Other  
Cycle Length: 91  
Actuated Cycle Length: 77.8  
Natural Cycle: 60  
Control Type: Actuated-Uncoordinated  
Maximum v/c Ratio: 0.79  
Intersection Signal Delay: 17.4  
Intersection Capacity Utilization 82.7%  
Analysis Period (min) 15  
# 95th percentile volume exceeds capacity, queue may be longer.  
Queue shown is maximum after two cycles.

Splits and Phases: 19: Wells Avenue/JCC Driveway & Nahanton Street



Lanes, Volumes, Timings  
VHB/MSD  
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07/03/2018

12239.00 :: Needham Street  
20: Highland Avenue & Riverside Street

2025 Build Conditions - without Shuttle Service  
Timing Plan: Weekday Morning

| Intersection             |        |       |        |       |        |      |
|--------------------------|--------|-------|--------|-------|--------|------|
| Int Delay, s/veh         | 0.6    |       |        |       |        |      |
| Movement                 | NWL    | NWR   | NET    | NER   | SWL    | SWT  |
| Lane Configurations      | ↔      |       | ↕↕     |       |        | ↕    |
| Traffic Vol, veh/h       | 10     | 1     | 1065   | 5     | 1      | 1010 |
| Future Vol, veh/h        | 10     | 1     | 1065   | 5     | 1      | 1010 |
| Conflicting Peds, #/hr   | 0      | 1     | 0      | 3     | 3      | 0    |
| Sign Control             | Stop   | Stop  | Free   | Free  | Free   | Free |
| RT Channelized           | -      | None  | -      | None  | -      | None |
| Storage Length           | 0      | -     | -      | -     | -      | -    |
| Veh in Median Storage, # | 0      | -     | 0      | -     | -      | 0    |
| Grade, %                 | 0      | -     | 0      | -     | -      | 0    |
| Peak Hour Factor         | 92     | 92    | 92     | 92    | 92     | 92   |
| Heavy Vehicles, %        | 0      | 0     | 1      | 1     | 1      | 1    |
| Mvmt Flow                | 11     | 1     | 1158   | 5     | 1      | 1098 |
| Major/Minor              |        |       |        |       |        |      |
| Minor1                   | Major1 |       | Major2 |       |        |      |
| Conflicting Flow All     | 2263   | 586   | 0      | 0     | 1166   | 0    |
| Stage 1                  | 1163   | -     | -      | -     | -      | -    |
| Stage 2                  | 1100   | -     | -      | -     | -      | -    |
| Critical Hdwy            | 6.6    | 6.9   | -      | -     | 4.115  | -    |
| Critical Hdwy Stg 1      | 5.8    | -     | -      | -     | -      | -    |
| Critical Hdwy Stg 2      | 5.4    | -     | -      | -     | -      | -    |
| Follow-up Hdwy           | 3.5    | 3.3   | -      | -     | 2.2095 | -    |
| Pot Cap-1 Maneuver       | 40     | 459   | -      | -     | 602    | -    |
| Stage 1                  | 264    | -     | -      | -     | -      | -    |
| Stage 2                  | 322    | -     | -      | -     | -      | -    |
| Platoon blocked, %       |        | -     | -      | -     | -      | -    |
| Mov Cap-1 Maneuver       | 40     | 457   | -      | -     | 601    | -    |
| Mov Cap-2 Maneuver       | 40     | -     | -      | -     | -      | -    |
| Stage 1                  | 263    | -     | -      | -     | -      | -    |
| Stage 2                  | 321    | -     | -      | -     | -      | -    |
| Approach                 |        |       |        |       |        |      |
| NW                       | NE     |       | SW     |       |        |      |
| HCM Control Delay, s     | 114.9  | 0     | 0      | 0     | 0      | 0    |
| HCM LOS                  | F      |       |        |       |        |      |
| Minor Lane/Major Mvmt    |        |       |        |       |        |      |
| NET                      | NER    | NWLn1 | SWL    | SWT   |        |      |
| Capacity (veh/h)         | -      | -     | 44     | 601   | -      | -    |
| HCM Lane V/C Ratio       | -      | -     | 0.272  | 0.002 | -      | -    |
| HCM Control Delay (s)    | -      | -     | 114.9  | 11    | 0      | -    |
| HCM Lane LOS             | -      | -     | F      | B     | A      | -    |
| HCM 95th %ile Q(veh)     | -      | -     | 0.9    | 0     | -      | -    |

12239.00 :: Needham Street  
21: Highland Avenue & Highland Terrace/Highland Circle

2025 Build Conditions - without Shuttle Service  
Timing Plan: Weekday Morning

| Intersection             |        |      |       |        |      |       |        |      |      |      |      |      |   |
|--------------------------|--------|------|-------|--------|------|-------|--------|------|------|------|------|------|---|
| Int Delay, s/veh         | 0.3    |      |       |        |      |       |        |      |      |      |      |      |   |
| Movement                 | SEL    | SET  | SER   | NWL    | NWT  | NWR   | NEL    | NET  | NER  | SWL  | SWT  | SWR  |   |
| Lane Configurations      |        | ↕    |       |        | ↕    |       |        | ↕↕   |      |      | ↕↕   |      |   |
| Traffic Vol, veh/h       | 1      | 0    | 5     | 5      | 0    | 5     | 5      | 1065 | 5    | 2    | 1015 | 5    |   |
| Future Vol, veh/h        | 1      | 0    | 5     | 5      | 0    | 5     | 5      | 1065 | 5    | 2    | 1015 | 5    |   |
| Conflicting Peds, #/hr   | 0      | 0    | 0     | 0      | 0    | 0     | 4      | 0    | 2    | 2    | 0    | 4    |   |
| Sign Control             | Stop   | Stop | Stop  | Stop   | Stop | Stop  | Free   | Free | Free | Free | Free | Free |   |
| RT Channelized           | -      | -    | None  | -      | -    | None  | -      | -    | None | -    | -    | None |   |
| Storage Length           | -      | -    | -     | -      | -    | -     | -      | -    | -    | -    | -    | -    |   |
| Veh in Median Storage, # | -      | 0    | -     | -      | 0    | -     | -      | 0    | -    | -    | 0    | -    |   |
| Grade, %                 | -      | 0    | -     | -      | 0    | -     | -      | 0    | -    | -    | 0    | -    |   |
| Peak Hour Factor         | 92     | 92   | 92    | 92     | 92   | 92    | 92     | 92   | 92   | 92   | 92   | 92   |   |
| Heavy Vehicles, %        | 0      | 0    | 0     | 0      | 0    | 0     | 1      | 1    | 1    | 1    | 1    | 1    |   |
| Mvmt Flow                | 1      | 0    | 5     | 5      | 0    | 5     | 5      | 1158 | 5    | 2    | 1103 | 5    |   |
| Major/Minor              |        |      |       |        |      |       |        |      |      |      |      |      |   |
| Minor2                   | Minor1 |      |       | Major1 |      |       | Major2 |      |      |      |      |      |   |
| Conflicting Flow All     | 1704   | 2290 | 558   | 1729   | 2290 | 584   | 1113   | 0    | 0    | 1165 | 0    | 0    |   |
| Stage 1                  | 1114   | 1114 | -     | 1173   | 1173 | -     | -      | -    | -    | -    | -    | -    |   |
| Stage 2                  | 590    | 1176 | -     | 556    | 1117 | -     | -      | -    | -    | -    | -    | -    |   |
| Critical Hdwy            | 7.5    | 6.5  | 6.9   | 7.5    | 6.5  | 6.9   | 4.12   | -    | -    | 4.12 | -    | -    |   |
| Critical Hdwy Stg 1      | 6.5    | 5.5  | -     | 6.5    | 5.5  | -     | -      | -    | -    | -    | -    | -    |   |
| Critical Hdwy Stg 2      | 6.5    | 5.5  | -     | 6.5    | 5.5  | -     | -      | -    | -    | -    | -    | -    |   |
| Follow-up Hdwy           | 3.5    | 4    | 3.3   | 3.5    | 4    | 3.3   | 2.21   | -    | -    | 2.21 | -    | -    |   |
| Pot Cap-1 Maneuver       | 60     | 40   | 478   | 58     | 40   | 460   | 629    | -    | -    | 601  | -    | -    |   |
| Stage 1                  | 225    | 286  | -     | 207    | 268  | -     | -      | -    | -    | -    | -    | -    |   |
| Stage 2                  | 466    | 267  | -     | 488    | 285  | -     | -      | -    | -    | -    | -    | -    |   |
| Platoon blocked, %       |        |      |       |        |      |       | -      | -    | -    | -    | -    | -    |   |
| Mov Cap-1 Maneuver       | 58     | 39   | 476   | 56     | 39   | 459   | 629    | -    | -    | 601  | -    | -    |   |
| Mov Cap-2 Maneuver       | 58     | 39   | -     | 56     | 39   | -     | -      | -    | -    | -    | -    | -    |   |
| Stage 1                  | 219    | 282  | -     | 202    | 261  | -     | -      | -    | -    | -    | -    | -    |   |
| Stage 2                  | 450    | 260  | -     | 478    | 281  | -     | -      | -    | -    | -    | -    | -    |   |
| Approach                 |        |      |       |        |      |       |        |      |      |      |      |      |   |
| SE                       | NW     |      |       | NE     |      |       | SW     |      |      |      |      |      |   |
| HCM Control Delay, s     | 22.2   |      |       | 45.3   |      |       | 0.1    |      |      | 0    |      |      |   |
| HCM LOS                  | C      |      |       | E      |      |       |        |      |      |      |      |      |   |
| Minor Lane/Major Mvmt    |        |      |       |        |      |       |        |      |      |      |      |      |   |
| NEL                      | NET    | NER  | NWLn1 | SELn1  | SWL  | SWT   | SWR    |      |      |      |      |      |   |
| Capacity (veh/h)         | 629    | -    | -     | 100    | 216  | 601   | -      | -    | -    | -    | -    | -    | - |
| HCM Lane V/C Ratio       | 0.009  | -    | -     | 0.109  | 0.03 | 0.004 | -      | -    | -    | -    | -    | -    | - |
| HCM Control Delay (s)    | 10.8   | 0.1  | -     | 45.3   | 22.2 | 11    | 0      | -    | -    | -    | -    | -    | - |
| HCM Lane LOS             | B      | A    | -     | E      | C    | B     | A      | -    | -    | -    | -    | -    | - |
| HCM 95th %ile Q(veh)     | 0      | -    | -     | 0.4    | 0.1  | 0     | -      | -    | -    | -    | -    | -    | - |

12239.00 :: Needham Street  
22: 2nd Avenue/Staples Driveway & Highland Avenue

2025 Build Conditions - without Shuttle Service  
Timing Plan: Weekday Morning

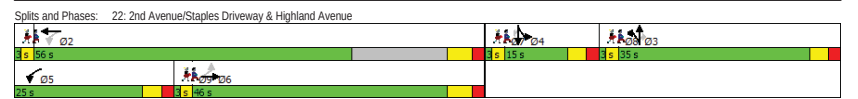
| Lane Group                                                      | EBL                                                                               | EBT                                                                               | EBR  | WBL                                                                               | WBT                                                                               | WBR  | NBL                                                                               | NBT                                                                               | NBR   | SBL                                                                               | SBT                                                                               | SBR   | Ø1   | Ø7   | Ø8   | Ø9   |
|-----------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-------|------|------|------|------|
| Lane Configurations                                             |  |  |      |  |  |      |  |  |       |  |  |       |      |      |      |      |
| Traffic Volume (vph)                                            | 5                                                                                 | 850                                                                               | 245  | 325                                                                               | 680                                                                               | 20   | 175                                                                               | 10                                                                                | 175   | 20                                                                                | 10                                                                                | 0     |      |      |      |      |
| Future Volume (vph)                                             | 5                                                                                 | 850                                                                               | 245  | 325                                                                               | 680                                                                               | 20   | 175                                                                               | 10                                                                                | 175   | 20                                                                                | 10                                                                                | 0     |      |      |      |      |
| Ideal Flow (vphpl)                                              | 1900                                                                              | 1900                                                                              | 1900 | 1900                                                                              | 1900                                                                              | 1900 | 1900                                                                              | 1900                                                                              | 1900  | 1900                                                                              | 1900                                                                              | 1900  |      |      |      |      |
| Storage Length (ft)                                             | 100                                                                               |                                                                                   | 0    | 100                                                                               |                                                                                   | 0    | 150                                                                               |                                                                                   | 100   |                                                                                   | 0                                                                                 | 50    |      |      |      |      |
| Storage Lanes                                                   | 1                                                                                 |                                                                                   | 0    |                                                                                   |                                                                                   | 0    | 1                                                                                 |                                                                                   |       | 1                                                                                 |                                                                                   | 0     |      |      |      |      |
| Taper Length (ft)                                               | 25                                                                                |                                                                                   |      | 25                                                                                |                                                                                   |      | 25                                                                                |                                                                                   |       | 25                                                                                |                                                                                   |       |      |      |      |      |
| Satd. Flow (prot)                                               | 1787                                                                              | 3434                                                                              | 0    | 0                                                                                 | 3504                                                                              | 0    | 1681                                                                              | 1694                                                                              | 1583  | 0                                                                                 | 1839                                                                              | 1900  |      |      |      |      |
| Flt Permitted                                                   | 0.201                                                                             |                                                                                   |      |                                                                                   | 0.510                                                                             |      | 0.950                                                                             | 0.957                                                                             |       |                                                                                   | 0.968                                                                             |       |      |      |      |      |
| Satd. Flow (perm)                                               | 377                                                                               | 3434                                                                              | 0    | 0                                                                                 | 1816                                                                              | 0    | 1678                                                                              | 1691                                                                              | 1544  | 0                                                                                 | 1825                                                                              | 1900  |      |      |      |      |
| Right Turn on Red                                               |                                                                                   |                                                                                   | Yes  |                                                                                   |                                                                                   | Yes  |                                                                                   |                                                                                   | Yes   |                                                                                   |                                                                                   | Yes   |      |      |      |      |
| Satd. Flow (RTOR)                                               |                                                                                   | 30                                                                                |      |                                                                                   | 2                                                                                 |      |                                                                                   |                                                                                   | 190   |                                                                                   |                                                                                   |       |      |      |      |      |
| Link Speed (mph)                                                |                                                                                   | 30                                                                                |      |                                                                                   | 30                                                                                |      |                                                                                   |                                                                                   | 30    |                                                                                   |                                                                                   | 30    |      |      |      |      |
| Link Distance (ft)                                              |                                                                                   | 210                                                                               |      |                                                                                   | 361                                                                               |      |                                                                                   |                                                                                   | 859   |                                                                                   |                                                                                   | 290   |      |      |      |      |
| Travel Time (s)                                                 |                                                                                   | 4.8                                                                               |      |                                                                                   | 8.2                                                                               |      |                                                                                   |                                                                                   | 19.5  |                                                                                   |                                                                                   | 6.6   |      |      |      |      |
| Confl. Peds. (#/hr)                                             | 3                                                                                 |                                                                                   | 1    | 1                                                                                 |                                                                                   | 3    | 1                                                                                 |                                                                                   | 6     | 6                                                                                 |                                                                                   | 1     |      |      |      |      |
| Confl. Bikes (#/hr)                                             |                                                                                   |                                                                                   | 1    |                                                                                   |                                                                                   |      |                                                                                   |                                                                                   |       |                                                                                   |                                                                                   |       |      |      |      |      |
| Peak Hour Factor                                                | 0.92                                                                              | 0.92                                                                              | 0.92 | 0.92                                                                              | 0.92                                                                              | 0.92 | 0.92                                                                              | 0.92                                                                              | 0.92  | 0.92                                                                              | 0.92                                                                              | 0.92  |      |      |      |      |
| Heavy Vehicles (%)                                              | 1%                                                                                | 1%                                                                                | 1%   | 1%                                                                                | 1%                                                                                | 1%   |                                                                                   | 2%                                                                                | 2%    | 0%                                                                                | 0%                                                                                | 0%    |      |      |      |      |
| Shared Lane Traffic (%)                                         |                                                                                   |                                                                                   |      |                                                                                   |                                                                                   |      | 47%                                                                               |                                                                                   |       |                                                                                   |                                                                                   |       |      |      |      |      |
| Lane Group Flow (vph)                                           | 5                                                                                 | 1190                                                                              | 0    | 0                                                                                 | 1114                                                                              | 0    | 101                                                                               | 100                                                                               | 190   | 0                                                                                 | 33                                                                                | 0     |      |      |      |      |
| Turn Type                                                       | Perm                                                                              | NA                                                                                |      | pm+pt                                                                             | NA                                                                                |      | Split                                                                             | NA                                                                                | Perm  | Split                                                                             | NA                                                                                | Perm  |      |      |      |      |
| Protected Phases                                                |                                                                                   | 6                                                                                 |      | 5                                                                                 | 2                                                                                 |      | 3                                                                                 | 3                                                                                 |       | 4                                                                                 | 4                                                                                 |       | 1    | 7    | 8    | 9    |
| Permitted Phases                                                | 6                                                                                 |                                                                                   |      | 2                                                                                 |                                                                                   |      |                                                                                   | 3                                                                                 |       |                                                                                   |                                                                                   | 4     |      |      |      |      |
| Detector Phase                                                  | 6                                                                                 | 6                                                                                 |      | 5                                                                                 | 2                                                                                 |      | 3                                                                                 | 3                                                                                 | 4     | 4                                                                                 |                                                                                   | 4     |      |      |      |      |
| Switch Phase                                                    |                                                                                   |                                                                                   |      |                                                                                   |                                                                                   |      |                                                                                   |                                                                                   |       |                                                                                   |                                                                                   |       |      |      |      |      |
| Minimum Initial (s)                                             | 15.0                                                                              | 15.0                                                                              |      | 4.0                                                                               | 15.0                                                                              |      | 10.0                                                                              | 10.0                                                                              | 10.0  | 4.0                                                                               | 4.0                                                                               | 4.0   | 1.0  | 1.0  | 1.0  | 1.0  |
| Minimum Split (s)                                               | 31.0                                                                              | 31.0                                                                              |      | 9.0                                                                               | 23.0                                                                              |      | 23.0                                                                              | 23.0                                                                              | 23.0  | 26.0                                                                              | 26.0                                                                              | 26.0  | 3.0  | 3.0  | 3.0  | 3.0  |
| Total Split (s)                                                 | 46.0                                                                              | 46.0                                                                              |      | 25.0                                                                              | 56.0                                                                              |      | 35.0                                                                              | 35.0                                                                              | 35.0  | 15.0                                                                              | 15.0                                                                              | 15.0  | 3.0  | 3.0  | 3.0  | 3.0  |
| Total Split (%)                                                 | 35.4%                                                                             | 35.4%                                                                             |      | 19.2%                                                                             | 43.1%                                                                             |      | 26.9%                                                                             | 26.9%                                                                             | 26.9% | 11.5%                                                                             | 11.5%                                                                             | 11.5% | 2%   | 2%   | 2%   | 2%   |
| Yellow Time (s)                                                 | 4.0                                                                               | 4.0                                                                               |      | 3.0                                                                               | 4.0                                                                               |      | 3.0                                                                               | 3.0                                                                               | 3.0   | 3.0                                                                               | 3.0                                                                               | 3.0   | 2.0  | 2.0  | 2.0  | 2.0  |
| All-Red Time (s)                                                | 2.0                                                                               | 2.0                                                                               |      | 2.0                                                                               | 2.0                                                                               |      | 2.0                                                                               | 2.0                                                                               | 2.0   | 2.0                                                                               | 2.0                                                                               | 2.0   | 0.0  | 0.0  | 0.0  | 0.0  |
| Lost Time Adjust (s)                                            | 0.0                                                                               | 0.0                                                                               |      | 0.0                                                                               | 0.0                                                                               |      | 0.0                                                                               | 0.0                                                                               | 0.0   |                                                                                   | 0.0                                                                               | 0.0   |      |      |      |      |
| Total Lost Time (s)                                             | 6.0                                                                               | 6.0                                                                               |      |                                                                                   | 6.0                                                                               |      | 5.0                                                                               | 5.0                                                                               | 5.0   |                                                                                   | 5.0                                                                               | 5.0   |      |      |      |      |
| Lead/Lag                                                        |                                                                                   |                                                                                   |      | Lead                                                                              | Lag                                                                               |      | Lag                                                                               | Lag                                                                               | Lag   | Lag                                                                               | Lag                                                                               | Lag   | Lead | Lead | Lead | Lag  |
| Lead-Lag Optimize?                                              |                                                                                   |                                                                                   |      |                                                                                   |                                                                                   |      |                                                                                   |                                                                                   |       |                                                                                   |                                                                                   |       |      |      |      |      |
| Recall Mode                                                     | None                                                                              | None                                                                              |      | None                                                                              | None                                                                              |      | None                                                                              | None                                                                              | None  | None                                                                              | None                                                                              | None  | None | None | None | None |
| Act Effect Green (s)                                            | 46.8                                                                              | 46.8                                                                              |      |                                                                                   | 46.8                                                                              |      | 11.9                                                                              | 11.9                                                                              | 11.9  |                                                                                   |                                                                                   | 7.9   |      |      |      |      |
| Actuated g/C Ratio                                              | 0.59                                                                              | 0.59                                                                              |      |                                                                                   | 0.59                                                                              |      | 0.15                                                                              | 0.15                                                                              | 0.15  |                                                                                   |                                                                                   | 0.10  |      |      |      |      |
| v/c Ratio                                                       | 0.02                                                                              | 0.59                                                                              |      |                                                                                   | 1.80                                                                              |      | 0.40                                                                              | 0.40                                                                              | 0.48  |                                                                                   |                                                                                   | 0.18  |      |      |      |      |
| Control Delay                                                   | 13.6                                                                              | 14.5                                                                              |      |                                                                                   | 59.9                                                                              |      | 41.1                                                                              | 40.9                                                                              | 10.8  |                                                                                   |                                                                                   | 39.1  |      |      |      |      |
| Queue Delay                                                     | 0.0                                                                               | 0.0                                                                               |      |                                                                                   | 0.0                                                                               |      | 0.0                                                                               | 0.0                                                                               | 0.0   |                                                                                   |                                                                                   | 0.0   |      |      |      |      |
| Total Delay                                                     | 13.6                                                                              | 14.5                                                                              |      |                                                                                   | 59.9                                                                              |      | 41.1                                                                              | 40.9                                                                              | 10.8  |                                                                                   |                                                                                   | 39.1  |      |      |      |      |
| LOS                                                             | B                                                                                 | B                                                                                 |      |                                                                                   | E                                                                                 |      | D                                                                                 | D                                                                                 | D     |                                                                                   |                                                                                   | D     |      |      |      |      |
| Approach Delay                                                  |                                                                                   | 14.5                                                                              |      |                                                                                   | 59.9                                                                              |      |                                                                                   | 26.3                                                                              |       |                                                                                   |                                                                                   | 39.1  |      |      |      |      |
| Approach LOS                                                    |                                                                                   | B                                                                                 |      |                                                                                   | E                                                                                 |      |                                                                                   | C                                                                                 |       |                                                                                   |                                                                                   | D     |      |      |      |      |
| Queue Length 50th (ft)                                          | 1                                                                                 | 167                                                                               |      |                                                                                   | ~276                                                                              |      | 51                                                                                | 51                                                                                | 0     |                                                                                   |                                                                                   | 16    |      |      |      |      |
| Queue Length 95th (ft)                                          | 10                                                                                | 464                                                                               |      |                                                                                   | #716                                                                              |      | 128                                                                               | 126                                                                               | 63    |                                                                                   |                                                                                   | 49    |      |      |      |      |
| Internal Link Dist (ft)                                         |                                                                                   | 130                                                                               |      |                                                                                   | 281                                                                               |      |                                                                                   | 779                                                                               |       |                                                                                   |                                                                                   | 210   |      |      |      |      |
| Turn Bay Length (ft)                                            | 100                                                                               |                                                                                   |      |                                                                                   |                                                                                   |      | 150                                                                               |                                                                                   | 100   |                                                                                   |                                                                                   |       |      |      |      |      |
| Base Capacity (vph)                                             | 226                                                                               | 2070                                                                              |      |                                                                                   | 1505                                                                              |      | 672                                                                               | 677                                                                               | 731   |                                                                                   |                                                                                   | 280   |      |      |      |      |
| Starvation Cap Reductn                                          | 0                                                                                 | 0                                                                                 |      |                                                                                   | 0                                                                                 |      | 0                                                                                 | 0                                                                                 | 0     |                                                                                   |                                                                                   | 0     |      |      |      |      |
| Spillback Cap Reductn                                           | 0                                                                                 | 0                                                                                 |      |                                                                                   | 0                                                                                 |      | 0                                                                                 | 0                                                                                 | 0     |                                                                                   |                                                                                   | 0     |      |      |      |      |
| Storage Cap Reductn                                             | 0                                                                                 | 0                                                                                 |      |                                                                                   | 0                                                                                 |      | 0                                                                                 | 0                                                                                 | 0     |                                                                                   |                                                                                   | 0     |      |      |      |      |
| Reduced v/c Ratio                                               | 0.02                                                                              | 0.57                                                                              |      |                                                                                   | 0.74                                                                              |      | 0.15                                                                              | 0.15                                                                              | 0.26  |                                                                                   |                                                                                   | 0.12  |      |      |      |      |
| Intersection Summary                                            |                                                                                   |                                                                                   |      |                                                                                   |                                                                                   |      |                                                                                   |                                                                                   |       |                                                                                   |                                                                                   |       |      |      |      |      |
| Area Type: Other                                                |                                                                                   |                                                                                   |      |                                                                                   |                                                                                   |      |                                                                                   |                                                                                   |       |                                                                                   |                                                                                   |       |      |      |      |      |
| Cycle Length: 130                                               |                                                                                   |                                                                                   |      |                                                                                   |                                                                                   |      |                                                                                   |                                                                                   |       |                                                                                   |                                                                                   |       |      |      |      |      |
| Actuated Cycle Length: 79.6                                     |                                                                                   |                                                                                   |      |                                                                                   |                                                                                   |      |                                                                                   |                                                                                   |       |                                                                                   |                                                                                   |       |      |      |      |      |
| Natural Cycle: 150                                              |                                                                                   |                                                                                   |      |                                                                                   |                                                                                   |      |                                                                                   |                                                                                   |       |                                                                                   |                                                                                   |       |      |      |      |      |
| Control Type: Actuated-Uncoordinated                            |                                                                                   |                                                                                   |      |                                                                                   |                                                                                   |      |                                                                                   |                                                                                   |       |                                                                                   |                                                                                   |       |      |      |      |      |
| Maximum v/c Ratio: 1.04                                         |                                                                                   |                                                                                   |      |                                                                                   |                                                                                   |      |                                                                                   |                                                                                   |       |                                                                                   |                                                                                   |       |      |      |      |      |
| Intersection Signal Delay: 35.0                                 |                                                                                   |                                                                                   |      |                                                                                   |                                                                                   |      |                                                                                   |                                                                                   |       |                                                                                   |                                                                                   |       |      |      |      |      |
| Intersection Capacity Utilization 86.8%                         |                                                                                   |                                                                                   |      |                                                                                   |                                                                                   |      |                                                                                   |                                                                                   |       |                                                                                   |                                                                                   |       |      |      |      |      |
| Analysis Period (min) 15                                        |                                                                                   |                                                                                   |      |                                                                                   |                                                                                   |      |                                                                                   |                                                                                   |       |                                                                                   |                                                                                   |       |      |      |      |      |
| Volume exceeds capacity, queue is theoretically infinite.       |                                                                                   |                                                                                   |      |                                                                                   |                                                                                   |      |                                                                                   |                                                                                   |       |                                                                                   |                                                                                   |       |      |      |      |      |
| Queue shown is maximum after two cycles.                        |                                                                                   |                                                                                   |      |                                                                                   |                                                                                   |      |                                                                                   |                                                                                   |       |                                                                                   |                                                                                   |       |      |      |      |      |
| # 95th percentile volume exceeds capacity, queue may be longer. |                                                                                   |                                                                                   |      |                                                                                   |                                                                                   |      |                                                                                   |                                                                                   |       |                                                                                   |                                                                                   |       |      |      |      |      |
| Queue shown is maximum after two cycles.                        |                                                                                   |                                                                                   |      |                                                                                   |                                                                                   |      |                                                                                   |                                                                                   |       |                                                                                   |                                                                                   |       |      |      |      |      |
| d1 Defacto Left Lane. Recode with 1 though lane as a left lane. |                                                                                   |                                                                                   |      |                                                                                   |                                                                                   |      |                                                                                   |                                                                                   |       |                                                                                   |                                                                                   |       |      |      |      |      |

Lanes, Volumes, Timings  
VHB/MSD

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07/03/2018

12239.00 :: Needham Street  
22: 2nd Avenue/Staples Driveway & Highland Avenue

2025 Build Conditions - without Shuttle Service  
Timing Plan: Weekday Morning



Lanes, Volumes, Timings  
VHB/MSD

\\vhb\proj\Wat-LD\12239.00\tech\Traffic\Synchro\TIA\_2018\2025 BD\_AM\_CONSERVATIVE.syn  
07/03/2018

12239.00 :: Needham Street  
23: Highland Avenue & Charles Street

2025 Build Conditions - without Shuttle Service  
Timing Plan: Weekday Morning

| Intersection             |        |      |        |       |       |      |
|--------------------------|--------|------|--------|-------|-------|------|
| Int Delay, s/veh         | 0.5    |      |        |       |       |      |
| Movement                 | EBL    | EBT  | WBT    | WBR   | SBL   | SBR  |
| Lane Configurations      | ↰      | ↰↱   | ↰↱     |       | ↰     |      |
| Traffic Vol, veh/h       | 30     | 1095 | 835    | 20    | 5     | 35   |
| Future Vol, veh/h        | 30     | 1095 | 835    | 20    | 5     | 35   |
| Conflicting Peds, #/hr   | 4      | 0    | 0      | 4     | 0     | 0    |
| Sign Control             | Free   | Free | Free   | Free  | Stop  | Stop |
| RT Channelized           | -      | None | -      | None  | -     | None |
| Storage Length           | 100    | -    | -      | -     | 0     | -    |
| Veh in Median Storage, # | -      | 0    | 0      | -     | 0     | -    |
| Grade, %                 | -      | 0    | 0      | -     | 0     | -    |
| Peak Hour Factor         | 92     | 92   | 92     | 92    | 92    | 92   |
| Heavy Vehicles, %        | 1      | 1    | 2      | 2     | 0     | 0    |
| Mvmt Flow                | 33     | 1190 | 908    | 22    | 5     | 38   |
| Major/Minor              |        |      |        |       |       |      |
| Major1                   | Major2 |      | Minor2 |       |       |      |
| Conflicting Flow All     | 933    | 0    | -      | 0     | 1582  | 469  |
| Stage 1                  | -      | -    | -      | -     | 922   | -    |
| Stage 2                  | -      | -    | -      | -     | 660   | -    |
| Critical Hdwy            | 4.12   | -    | -      | -     | 6.8   | 6.9  |
| Critical Hdwy Stg 1      | -      | -    | -      | -     | 5.8   | -    |
| Critical Hdwy Stg 2      | -      | -    | -      | -     | 5.8   | -    |
| Follow-up Hdwy           | 2.21   | -    | -      | -     | 3.5   | 3.3  |
| Pot Cap-1 Maneuver       | 736    | -    | -      | -     | 101   | 546  |
| Stage 1                  | -      | -    | -      | -     | 353   | -    |
| Stage 2                  | -      | -    | -      | -     | 481   | -    |
| Platoon blocked, %       | -      | -    | -      | -     | -     | -    |
| Mov Cap-1 Maneuver       | 736    | -    | -      | -     | 96    | 544  |
| Mov Cap-2 Maneuver       | -      | -    | -      | -     | 96    | -    |
| Stage 1                  | -      | -    | -      | -     | 352   | -    |
| Stage 2                  | -      | -    | -      | -     | 458   | -    |
| Approach                 |        |      |        |       |       |      |
| EB                       | WB     |      | SB     |       |       |      |
| HCM Control Delay, s     | 0.3    | 0    |        |       | 17    |      |
| HCM LOS                  |        |      |        |       | C     |      |
| Minor Lane/Major Mvmt    |        |      |        |       |       |      |
| EBL                      | EBT    | WBT  | WBR    | SBLn1 |       |      |
| Capacity (veh/h)         | 736    | -    | -      | -     | 344   |      |
| HCM Lane V/C Ratio       | 0.044  | -    | -      | -     | 0.126 |      |
| HCM Control Delay (s)    | 10.1   | -    | -      | -     | 17    |      |
| HCM Lane LOS             | B      | -    | -      | -     | C     |      |
| HCM 95th %tile Q(veh)    | 0.1    | -    | -      | -     | 0.4   |      |

12239.00 :: Needham Street  
24: Highland Avenue & Wexford Street

2025 Build Conditions - without Shuttle Service  
Timing Plan: Weekday Morning

| Intersection             |        |      |        |       |       |      |
|--------------------------|--------|------|--------|-------|-------|------|
| Int Delay, s/veh         | 5.3    |      |        |       |       |      |
| Movement                 | EBL    | EBT  | WBT    | WBR   | SBL   | SBR  |
| Lane Configurations      | ↰      | ↰↱   | ↰↱     |       | ↰     |      |
| Traffic Vol, veh/h       | 115    | 1080 | 815    | 30    | 40    | 75   |
| Future Vol, veh/h        | 115    | 1080 | 815    | 30    | 40    | 75   |
| Conflicting Peds, #/hr   | 3      | 0    | 0      | 3     | 0     | 0    |
| Sign Control             | Free   | Free | Free   | Free  | Stop  | Stop |
| RT Channelized           | -      | None | -      | None  | -     | None |
| Storage Length           | 100    | -    | -      | -     | 0     | -    |
| Veh in Median Storage, # | -      | 0    | 0      | -     | 0     | -    |
| Grade, %                 | -      | 0    | 0      | -     | 0     | -    |
| Peak Hour Factor         | 92     | 92   | 92     | 92    | 92    | 92   |
| Heavy Vehicles, %        | 1      | 1    | 2      | 2     | 1     | 1    |
| Mvmt Flow                | 125    | 1174 | 886    | 33    | 43    | 82   |
| Major/Minor              |        |      |        |       |       |      |
| Major1                   | Major2 |      | Minor2 |       |       |      |
| Conflicting Flow All     | 921    | 0    | -      | 0     | 1742  | 462  |
| Stage 1                  | -      | -    | -      | -     | 905   | -    |
| Stage 2                  | -      | -    | -      | -     | 837   | -    |
| Critical Hdwy            | 4.12   | -    | -      | -     | 6.82  | 6.92 |
| Critical Hdwy Stg 1      | -      | -    | -      | -     | 5.82  | -    |
| Critical Hdwy Stg 2      | -      | -    | -      | -     | 5.82  | -    |
| Follow-up Hdwy           | 2.21   | -    | -      | -     | 3.51  | 3.31 |
| Pot Cap-1 Maneuver       | 743    | -    | -      | -     | 79    | 549  |
| Stage 1                  | -      | -    | -      | -     | 357   | -    |
| Stage 2                  | -      | -    | -      | -     | 388   | -    |
| Platoon blocked, %       | -      | -    | -      | -     | -     | -    |
| Mov Cap-1 Maneuver       | 743    | -    | -      | -     | 65    | 548  |
| Mov Cap-2 Maneuver       | -      | -    | -      | -     | 65    | -    |
| Stage 1                  | -      | -    | -      | -     | 356   | -    |
| Stage 2                  | -      | -    | -      | -     | 322   | -    |
| Approach                 |        |      |        |       |       |      |
| EB                       | WB     |      | SB     |       |       |      |
| HCM Control Delay, s     | 1      | 0    |        |       | 89.1  |      |
| HCM LOS                  |        |      |        |       | F     |      |
| Minor Lane/Major Mvmt    |        |      |        |       |       |      |
| EBL                      | EBT    | WBT  | WBR    | SBLn1 |       |      |
| Capacity (veh/h)         | 743    | -    | -      | -     | 153   |      |
| HCM Lane V/C Ratio       | 0.168  | -    | -      | -     | 0.817 |      |
| HCM Control Delay (s)    | 10.8   | -    | -      | -     | 89.1  |      |
| HCM Lane LOS             | B      | -    | -      | -     | F     |      |
| HCM 95th %tile Q(veh)    | 0.6    | -    | -      | -     | 5.3   |      |

12239.00 :: Needham Street  
 25: 1st Avenue/Riverside Community Care Driveway & Highland Avenue  
 2025 Build Conditions - without Shuttle Service  
 Timing Plan: Weekday Morning

| Lane Group              | EBL   | EBT   | EBR   | WBL   | WBT   | WBR   | NBL   | NBT   | NBR  | SBL  | SBT  | SBR  | Ø1 | Ø5 |
|-------------------------|-------|-------|-------|-------|-------|-------|-------|-------|------|------|------|------|----|----|
| Lane Configurations     |       | EBT   | EBR   | WBL   | WBT   | WBR   | NBL   | NBT   | NBR  | SBL  | SBT  | SBR  |    |    |
| Traffic Volume (vph)    | 0     | 1220  | 630   | 5     | 880   | 15    | 245   | 0     | 80   | 0    | 0    | 15   |    |    |
| Future Volume (vph)     | 0     | 1220  | 630   | 5     | 880   | 15    | 245   | 0     | 80   | 0    | 0    | 15   |    |    |
| Ideal Flow (vphpl)      | 1900  | 1900  | 1900  | 1900  | 1900  | 1900  | 1900  | 1900  | 1900 | 1900 | 1900 | 1900 |    |    |
| Storage Length (ft)     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 200  | 0    | 0    | 0    |    |    |
| Storage Lanes           | 0     | 1     | 0     | 0     | 0     | 1     | 0     | 0     | 0    | 0    | 0    | 0    |    |    |
| Taper Length (ft)       | 25    |       |       | 25    |       |       | 25    |       |      | 25   |      |      |    |    |
| Satd. Flow (prot)       | 0     | 3574  | 1599  | 0     | 3498  | 0     | 1665  | 1563  | 0    | 0    | 1644 | 0    |    |    |
| Flt Permitted           |       |       |       |       | 0.948 |       | 0.950 | 0.976 |      |      |      |      |    |    |
| Satd. Flow (perm)       | 0     | 3574  | 1562  | 0     | 3316  | 0     | 1665  | 1563  | 0    | 0    | 1644 | 0    |    |    |
| Right Turn on Red       |       | Yes   |       |       | Yes   |       |       | Yes   |      |      | Yes  |      |    |    |
| Satd. Flow (RTOR)       |       | 685   |       |       | 2     |       |       | 96    |      |      | 98   |      |    |    |
| Link Speed (mph)        | 30    |       |       |       | 30    |       |       | 30    |      |      | 30   |      |    |    |
| Link Distance (ft)      | 377   |       |       |       | 272   |       |       | 825   |      |      | 147  |      |    |    |
| Travel Time (s)         | 8.6   |       |       |       | 6.2   |       |       | 18.8  |      |      | 3.3  |      |    |    |
| Confl. Peds. (#/hr)     |       | 1     | 1     |       |       |       |       | 6     | 6    |      |      |      |    |    |
| Confl. Bikes (#/hr)     |       | 1     |       |       |       |       |       |       |      |      |      |      |    |    |
| Peak Hour Factor        | 0.92  | 0.92  | 0.92  | 0.92  | 0.92  | 0.92  | 0.92  | 0.92  | 0.92 | 0.92 | 0.92 | 0.92 |    |    |
| Heavy Vehicles (%)      | 1%    | 1%    | 1%    | 3%    | 3%    | 3%    | 3%    | 3%    | 3%   | 0%   | 0%   | 0%   |    |    |
| Shared Lane Traffic (%) |       |       |       |       |       |       | 32%   |       |      |      |      |      |    |    |
| Lane Group Flow (vph)   | 0     | 1326  | 685   | 0     | 978   | 0     | 181   | 172   | 0    | 0    | 16   | 0    |    |    |
| Turn Type               | NA    | pm+ov | Perm  | NA    | Split | NA    | NA    | NA    | NA   | NA   | NA   | NA   |    |    |
| Protected Phases        | 6     | 8     | 2     | 2     | 8     | 8     | 8     | 4     | 4    | 1    | 5    |      |    |    |
| Permitted Phases        | 6     | 2     |       |       |       |       |       | 4     |      |      |      |      |    |    |
| Detector Phase          | 6     | 8     | 2     | 2     | 8     | 8     | 8     | 4     | 4    |      |      |      |    |    |
| Switch Phase            |       |       |       |       |       |       |       |       |      |      |      |      |    |    |
| Minimum Initial (s)     | 10.0  | 6.0   | 10.0  | 10.0  | 6.0   | 6.0   | 6.0   | 6.0   | 6.0  | 1.0  | 1.0  |      |    |    |
| Minimum Split (s)       | 25.0  | 12.0  | 16.0  | 16.0  | 12.0  | 12.0  | 29.0  | 29.0  | 3.0  | 3.0  |      |      |    |    |
| Total Split (s)         | 55.0  | 26.0  | 55.0  | 55.0  | 26.0  | 26.0  | 30.0  | 30.0  | 3.0  | 3.0  |      |      |    |    |
| Total Split (%)         | 48.2% | 22.8% | 48.2% | 48.2% | 22.8% | 22.8% | 26.3% | 26.3% | 3%   | 3%   |      |      |    |    |
| Yellow Time (s)         | 4.0   | 4.0   | 4.0   | 4.0   | 4.0   | 4.0   | 4.0   | 4.0   | 2.0  | 2.0  |      |      |    |    |
| All-Red Time (s)        | 1.0   | 2.0   | 1.0   | 1.0   | 2.0   | 2.0   | 2.0   | 2.0   | 0.0  | 0.0  |      |      |    |    |
| Lost Time Adjust (s)    | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   |      |      |      |      |    |    |
| Total Lost Time (s)     | 5.0   | 6.0   | 5.0   | 5.0   | 6.0   | 6.0   | 6.0   | 6.0   |      |      |      |      |    |    |
| Lead/Lag                | Lag   | Lag   | Lag   | Lag   | Lag   | Lag   | Lag   | Lag   | Lead | Lead |      |      |    |    |
| Lead-Lag Optimize?      | Yes   | Yes   | Yes   | Yes   | Yes   | Yes   | Yes   | Yes   | Yes  | Yes  |      |      |    |    |
| Recall Mode             | Min   | None  | Min   | Min   | None  | None  | None  | None  | None | None |      |      |    |    |
| Act Effect Green (s)    | 32.9  | 47.3  | 33.3  | 33.3  | 15.6  | 15.6  | 15.6  | 15.6  | 9.1  | 9.1  |      |      |    |    |
| Actuated g/C Ratio      | 0.49  | 0.70  | 0.50  | 0.50  | 0.23  | 0.23  | 0.23  | 0.23  | 0.14 | 0.14 |      |      |    |    |
| v/c Ratio               | 0.76  | 0.52  | 0.59  | 0.59  | 0.47  | 0.39  | 0.47  | 0.39  | 0.05 | 0.05 |      |      |    |    |
| Control Delay           | 19.5  | 2.0   | 15.6  | 15.6  | 33.3  | 18.1  | 33.3  | 18.1  | 0.3  | 0.3  |      |      |    |    |
| Queue Delay             | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0  | 0.0  |      |      |    |    |
| Total Delay             | 19.5  | 2.0   | 15.6  | 15.6  | 33.3  | 18.1  | 33.3  | 18.1  | 0.3  | 0.3  |      |      |    |    |
| LOS                     | B     | A     | B     | B     | C     | B     | A     | A     |      |      |      |      |    |    |
| Approach Delay          | 13.6  |       | 15.6  |       | 25.8  |       | 0.3   |       |      |      |      |      |    |    |
| Approach LOS            | B     |       | B     |       | C     |       | A     |       |      |      |      |      |    |    |
| Queue Length 50th (ft)  | 154   | 0     | 101   |       | 50    | 20    |       |       |      |      |      |      |    |    |
| Queue Length 95th (ft)  | 537   | 33    | 343   |       | 209   | 124   |       |       |      |      |      |      |    |    |
| Internal Link Dist (ft) | 297   |       | 192   |       | 745   |       |       |       |      |      |      |      |    |    |
| Turn Bay Length (ft)    |       |       |       |       |       |       |       |       |      |      |      |      |    |    |
| Base Capacity (vph)     | 2819  | 1382  |       | 2633  | 582   | 609   |       |       |      | 746  |      |      |    |    |
| Starvation Cap Reductn  | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0    | 0    |      |      |    |    |
| Spillback Cap Reductn   | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0    | 0    |      |      |    |    |
| Storage Cap Reductn     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0    | 0    |      |      |    |    |
| Reduced v/c Ratio       | 0.47  | 0.50  |       | 0.37  | 0.31  | 0.28  |       |       |      | 0.02 |      |      |    |    |

| Intersection Summary               |                        |  |  |  |  |  |  |  |  |  |  |  |  |  |
|------------------------------------|------------------------|--|--|--|--|--|--|--|--|--|--|--|--|--|
| Area Type:                         | Other                  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Cycle Length:                      | 114                    |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Actuated Cycle Length:             | 67.1                   |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Natural Cycle:                     | 90                     |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Control Type:                      | Actuated-Uncoordinated |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Maximum v/c Ratio:                 | 0.76                   |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Intersection Signal Delay:         | 15.4                   |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Intersection Capacity Utilization: | 83.2%                  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| ICU Level of Service:              | E                      |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Analysis Period (min):             | 15                     |  |  |  |  |  |  |  |  |  |  |  |  |  |



12239.00 :: Needham Street  
 26: I-95 NB Ramps & Highland Avenue  
 2025 Build Conditions - without Shuttle Service  
 Timing Plan: Weekday Morning

| Intersection                                                                                                         |        |        |       |      |        |       |      |        |       |      |      |       |  |
|----------------------------------------------------------------------------------------------------------------------|--------|--------|-------|------|--------|-------|------|--------|-------|------|------|-------|--|
| Int Delay, s/veh                                                                                                     | 12.8   |        |       |      |        |       |      |        |       |      |      |       |  |
| Movement                                                                                                             | EBL    | EBT    | EBR   | WBL  | WBT    | WBR   | NBL  | NBT    | NBR   | SBL  | SBT  | SBR   |  |
| Lane Configurations                                                                                                  |        | ↕↕     | ↕     |      | ↕↕     |       |      |        | ↕     |      |      | ↕     |  |
| Traffic Vol, veh/h                                                                                                   | 0      | 1520   | 460   | 0    | 695    | 445   | 0    | 0      | 330   | 0    | 0    | 95    |  |
| Future Vol, veh/h                                                                                                    | 0      | 1520   | 460   | 0    | 695    | 445   | 0    | 0      | 330   | 0    | 0    | 95    |  |
| Conflicting Peds, #/hr                                                                                               | 0      | 0      | 2     | 0    | 2      | 0     | 0    | 0      | 2     | 0    | 0    | 0     |  |
| Sign Control                                                                                                         | Free   | Free   | Free  | Free | Free   | Free  | Stop | Stop   | Stop  | Stop | Stop | Stop  |  |
| RT Channelized                                                                                                       | -      | -      | Yield | -    | -      | Yield | -    | -      | Yield | -    | -    | Yield |  |
| Storage Length                                                                                                       | -      | -      | 0     | -    | -      | -     | -    | -      | 0     | -    | -    | 0     |  |
| Veh in Median Storage, #                                                                                             | -      | 0      | -     | -    | 0      | -     | -    | 0      | -     | -    | 0    | -     |  |
| Grade, %                                                                                                             | -      | 0      | -     | -    | 0      | -     | -    | 0      | -     | -    | 0    | -     |  |
| Peak Hour Factor                                                                                                     | 92     | 92     | 92    | 92   | 92     | 92    | 92   | 92     | 92    | 92   | 92   | 92    |  |
| Heavy Vehicles, %                                                                                                    | 0      | 0      | 0     | 3    | 3      | 3     | 2    | 2      | 2     | 2    | 2    | 2     |  |
| Mvmt Flow                                                                                                            | 0      | 1652   | 500   | 0    | 755    | 484   | 0    | 0      | 359   | 0    | 0    | 103   |  |
| Major/Minor                                                                                                          | Major1 | Major2 |       |      | Minor1 |       |      | Minor2 |       |      |      |       |  |
| Conflicting Flow All                                                                                                 | -      | 0      | 0     | -    | -      | 0     | -    | -      | 830   | -    | -    | 378   |  |
| Stage 1                                                                                                              | -      | -      | -     | -    | -      | -     | -    | -      | -     | -    | -    | -     |  |
| Stage 2                                                                                                              | -      | -      | -     | -    | -      | -     | -    | -      | -     | -    | -    | -     |  |
| Critical Hdwy                                                                                                        | -      | -      | -     | -    | -      | -     | -    | -      | 6.94  | -    | -    | 6.94  |  |
| Critical Hdwy Stg 1                                                                                                  | -      | -      | -     | -    | -      | -     | -    | -      | -     | -    | -    | -     |  |
| Critical Hdwy Stg 2                                                                                                  | -      | -      | -     | -    | -      | -     | -    | -      | -     | -    | -    | -     |  |
| Follow-up Hdwy                                                                                                       | -      | -      | -     | -    | -      | -     | -    | -      | 3.32  | -    | -    | 3.32  |  |
| Pot Cap-1 Maneuver                                                                                                   | 0      | -      | -     | 0    | -      | -     | 0    | 0      | ~ 313 | 0    | 0    | 620   |  |
| Stage 1                                                                                                              | 0      | -      | -     | 0    | -      | -     | 0    | 0      | -     | 0    | 0    | -     |  |
| Stage 2                                                                                                              | 0      | -      | -     | 0    | -      | -     | 0    | 0      | -     | 0    | 0    | -     |  |
| Platoon blocked, %                                                                                                   | -      | -      | -     | -    | -      | -     | -    | -      | -     | -    | -    | -     |  |
| Mov Cap-1 Maneuver                                                                                                   | -      | -      | -     | -    | -      | -     | -    | -      | ~ 312 | -    | -    | 620   |  |
| Mov Cap-2 Maneuver                                                                                                   | -      | -      | -     | -    | -      | -     | -    | -      | -     | -    | -    | -     |  |
| Stage 1                                                                                                              | -      | -      | -     | -    | -      | -     | -    | -      | -     | -    | -    | -     |  |
| Stage 2                                                                                                              | -      | -      | -     | -    | -      | -     | -    | -      | -     | -    | -    | -     |  |
| Approach                                                                                                             | EB     | WB     |       |      | NB     |       |      | SB     |       |      |      |       |  |
| HCM Control Delay, s                                                                                                 | 0      | 0      |       |      | 134.5  |       |      | 12     |       |      |      |       |  |
| HCM LOS                                                                                                              |        |        |       |      | F      |       |      | B      |       |      |      |       |  |
| Minor Lane/Major Mvmt                                                                                                | NBLn1  | EBT    | EBR   | WBT  | WBR    | SBLn1 |      |        |       |      |      |       |  |
| Capacity (veh/h)                                                                                                     | 312    | -      | -     | -    | -      | 620   |      |        |       |      |      |       |  |
| HCM Lane V/C Ratio                                                                                                   | 1.15   | -      | -     | -    | -      | 0.167 |      |        |       |      |      |       |  |
| HCM Control Delay (s)                                                                                                | 134.5  | -      | -     | -    | -      | 12    |      |        |       |      |      |       |  |
| HCM Lane LOS                                                                                                         | F      | -      | -     | -    | -      | B     |      |        |       |      |      |       |  |
| HCM 95th %ile Q(veh)                                                                                                 | 14.9   | -      | -     | -    | -      | 0.6   |      |        |       |      |      |       |  |
| Notes                                                                                                                |        |        |       |      |        |       |      |        |       |      |      |       |  |
| ~: Volume exceeds capacity    \$: Delay exceeds 300s    +: Computation Not Defined    *: All major volume in platoon |        |        |       |      |        |       |      |        |       |      |      |       |  |

Notes: - Volume exceeds capacity \$ Delay exceeds 300s + Computation Not Defined \*: All major volume in platoon

12239.00 :: Needham Street  
27: I-95 SB Ramps & Highland Avenue

2025 Build Conditions - without Shuttle Service  
Timing Plan: Weekday Morning

| Intersection                                                                                                         |          |      |       |        |      |       |          |      |       |        |      |       |
|----------------------------------------------------------------------------------------------------------------------|----------|------|-------|--------|------|-------|----------|------|-------|--------|------|-------|
| Int Delay, s/veh                                                                                                     | 157.5    |      |       |        |      |       |          |      |       |        |      |       |
| Movement                                                                                                             | EBL      | EBT  | EBR   | WBL    | WBT  | WBR   | NBL      | NBT  | NBR   | SBL    | SBT  | SBR   |
| Lane Configurations                                                                                                  |          | ↕↕   |       |        | ↕↕   | ↕     |          |      | ↕     |        | ↕    | ↕     |
| Traffic Vol, veh/h                                                                                                   | 0        | 1045 | 120   | 0      | 505  | 285   | 0        | 0    | 935   | 0      | 0    | 550   |
| Future Vol, veh/h                                                                                                    | 0        | 1045 | 120   | 0      | 505  | 285   | 0        | 0    | 935   | 0      | 0    | 550   |
| Conflicting Peds, #/hr                                                                                               | 0        | 0    | 1     | 1      | 0    | 0     | 0        | 0    | 1     | 0      | 0    | 0     |
| Sign Control                                                                                                         | Free     | Free | Free  | Free   | Free | Free  | Stop     | Stop | Stop  | Stop   | Stop | Stop  |
| RT Channelized                                                                                                       | -        | -    | Yield | -      | -    | Yield | -        | -    | Yield | -      | -    | Yield |
| Storage Length                                                                                                       | -        | -    | -     | -      | -    | 0     | -        | -    | 0     | -      | -    | 0     |
| Veh in Median Storage, #                                                                                             | -        | 0    | -     | -      | 0    | -     | -        | 0    | -     | -      | 0    | -     |
| Grade, %                                                                                                             | -        | 0    | -     | -      | 0    | -     | -        | 0    | -     | -      | 0    | -     |
| Peak Hour Factor                                                                                                     | 92       | 92   | 92    | 92     | 92   | 92    | 92       | 92   | 92    | 92     | 92   | 92    |
| Heavy Vehicles, %                                                                                                    | 1        | 1    | 1     | 3      | 3    | 3     | 2        | 2    | 2     | 2      | 2    | 2     |
| Mvmt Flow                                                                                                            | 0        | 1136 | 130   | 0      | 549  | 310   | 0        | 0    | 1016  | 0      | 0    | 598   |
| Major/Minor                                                                                                          | Major1   |      |       | Major2 |      |       | Minor1   |      |       | Minor2 |      |       |
| Conflicting Flow All                                                                                                 | -        | 0    | 0     | -      | -    | 0     | -        | -    | 570   | -      | -    | 274   |
| Stage 1                                                                                                              | -        | -    | -     | -      | -    | -     | -        | -    | -     | -      | -    | -     |
| Stage 2                                                                                                              | -        | -    | -     | -      | -    | -     | -        | -    | -     | -      | -    | -     |
| Critical Hdwy                                                                                                        | -        | -    | -     | -      | -    | -     | -        | -    | 6.94  | -      | -    | 6.94  |
| Critical Hdwy Stg 1                                                                                                  | -        | -    | -     | -      | -    | -     | -        | -    | -     | -      | -    | -     |
| Critical Hdwy Stg 2                                                                                                  | -        | -    | -     | -      | -    | -     | -        | -    | -     | -      | -    | -     |
| Follow-up Hdwy                                                                                                       | -        | -    | -     | -      | -    | -     | -        | -    | 3.32  | -      | -    | 3.32  |
| Pot Cap-1 Maneuver                                                                                                   | 0        | -    | -     | 0      | -    | -     | 0        | 0    | ~465  | 0      | 0    | 724   |
| Stage 1                                                                                                              | 0        | -    | -     | 0      | -    | -     | 0        | 0    | -     | 0      | 0    | -     |
| Stage 2                                                                                                              | 0        | -    | -     | 0      | -    | -     | 0        | 0    | -     | 0      | 0    | -     |
| Platoon blocked, %                                                                                                   | -        | -    | -     | -      | -    | -     | -        | -    | -     | -      | -    | -     |
| Mov Cap-1 Maneuver                                                                                                   | -        | -    | -     | -      | -    | -     | -        | -    | ~464  | -      | -    | 724   |
| Mov Cap-2 Maneuver                                                                                                   | -        | -    | -     | -      | -    | -     | -        | -    | -     | -      | -    | -     |
| Stage 1                                                                                                              | -        | -    | -     | -      | -    | -     | -        | -    | -     | -      | -    | -     |
| Stage 2                                                                                                              | -        | -    | -     | -      | -    | -     | -        | -    | -     | -      | -    | -     |
| Approach                                                                                                             | EB       |      |       | WB     |      |       | NB       |      |       | SB     |      |       |
| HCM Control Delay, s                                                                                                 | 0        |      |       | 0      |      |       | \$ 562.3 |      |       | 28.9   |      |       |
| HCM LOS                                                                                                              |          |      |       |        |      |       | F        |      |       | D      |      |       |
| Minor Lane/Major Mvmt                                                                                                | NBLn1    | EBT  | EBR   | WBT    | WBR  | SBLn1 |          |      |       |        |      |       |
| Capacity (veh/h)                                                                                                     | 464      | -    | -     | -      | -    | 724   |          |      |       |        |      |       |
| HCM Lane V/C Ratio                                                                                                   | 2.19     | -    | -     | -      | -    | 0.826 |          |      |       |        |      |       |
| HCM Control Delay (s)                                                                                                | \$ 562.3 | -    | -     | -      | -    | 28.9  |          |      |       |        |      |       |
| HCM Lane LOS                                                                                                         | F        | -    | -     | -      | -    | D     |          |      |       |        |      |       |
| HCM 95th %tile Q(veh)                                                                                                | 74.2     | -    | -     | -      | -    | 9     |          |      |       |        |      |       |
| Notes                                                                                                                |          |      |       |        |      |       |          |      |       |        |      |       |
| ~: Volume exceeds capacity    \$: Delay exceeds 300s    +: Computation Not Defined    *: All major volume in platoon |          |      |       |        |      |       |          |      |       |        |      |       |

12239.00 :: Needham Street  
1: Chestnut Street & Route 9 WB Access Road

2025 Build Conditions without Shuttle Service  
Timing Plan: Weekday Evening

| Intersection               |       |       |       |       |      |      |       |      |      |       |      |      |
|----------------------------|-------|-------|-------|-------|------|------|-------|------|------|-------|------|------|
| Intersection Delay, s/veh  | 120.2 |       |       |       |      |      |       |      |      |       |      |      |
| Intersection LOS           | F     |       |       |       |      |      |       |      |      |       |      |      |
| Movement                   | EBL   | EBT   | EBR   | WBL   | WBT  | WBR  | NBL   | NBT  | NBR  | SBL   | SBT  | SBR  |
| Lane Configurations        |       | ↕     |       |       | ↕    |      |       | ↕    |      |       | ↕    |      |
| Traffic Vol, veh/h         | 120   | 1     | 30    | 125   | 30   | 30   | 65    | 520  | 1    | 1     | 450  | 230  |
| Future Vol, veh/h          | 120   | 1     | 30    | 125   | 30   | 30   | 65    | 520  | 1    | 1     | 450  | 230  |
| Peak Hour Factor           | 0.92  | 0.92  | 0.92  | 0.92  | 0.92 | 0.92 | 0.92  | 0.92 | 0.92 | 0.92  | 0.92 | 0.92 |
| Heavy Vehicles, %          | 0     | 0     | 0     | 0     | 0    | 0    | 0     | 0    | 0    | 0     | 0    | 0    |
| Mvmt Flow                  | 130   | 1     | 33    | 136   | 33   | 33   | 71    | 565  | 1    | 1     | 489  | 250  |
| Number of Lanes            | 0     | 1     | 0     | 0     | 1    | 0    | 0     | 1    | 0    | 0     | 1    | 0    |
| Approach                   | EB    |       |       | WB    |      |      | NB    |      |      | SB    |      |      |
| Opposing Approach          | WB    |       |       | EB    |      |      | SB    |      |      | NB    |      |      |
| Opposing Lanes             | 1     |       |       | 1     |      |      | 1     |      |      | 1     |      |      |
| Conflicting Approach Left  | SB    |       |       | NB    |      |      | EB    |      |      | WB    |      |      |
| Conflicting Lanes Left     | 1     |       |       | 1     |      |      | 1     |      |      | 1     |      |      |
| Conflicting Approach Right | NB    |       |       | SB    |      |      | WB    |      |      | EB    |      |      |
| Conflicting Lanes Right    | 1     |       |       | 1     |      |      | 1     |      |      | 1     |      |      |
| HCM Control Delay          | 17.6  |       |       | 19    |      |      | 118.6 |      |      | 171.9 |      |      |
| HCM LOS                    | C     |       |       | C     |      |      | F     |      |      | F     |      |      |
| Lane                       | NBLn1 | EBLn1 | WBLn1 | SBLn1 |      |      |       |      |      |       |      |      |
| Vol Left, %                | 11%   | 79%   | 68%   | 0%    |      |      |       |      |      |       |      |      |
| Vol Thru, %                | 89%   | 1%    | 16%   | 66%   |      |      |       |      |      |       |      |      |
| Vol Right, %               | 0%    | 20%   | 16%   | 34%   |      |      |       |      |      |       |      |      |
| Sign Control               | Stop  | Stop  | Stop  | Stop  |      |      |       |      |      |       |      |      |
| Traffic Vol by Lane        | 586   | 151   | 185   | 681   |      |      |       |      |      |       |      |      |
| LT Vol                     | 65    | 120   | 125   | 1     |      |      |       |      |      |       |      |      |
| Through Vol                | 520   | 1     | 30    | 450   |      |      |       |      |      |       |      |      |
| RT Vol                     | 1     | 30    | 30    | 230   |      |      |       |      |      |       |      |      |
| Lane Flow Rate             | 637   | 164   | 201   | 740   |      |      |       |      |      |       |      |      |
| Geometry Grp               | 1     | 1     | 1     | 1     |      |      |       |      |      |       |      |      |
| Degree of Util (X)         | 1.164 | 0.372 | 0.445 | 1.306 |      |      |       |      |      |       |      |      |
| Departure Headway (Hd)     | 7.169 | 9.231 | 8.983 | 6.748 |      |      |       |      |      |       |      |      |
| Convergence, Y/N           | Yes   | Yes   | Yes   | Yes   |      |      |       |      |      |       |      |      |
| Cap                        | 510   | 392   | 404   | 548   |      |      |       |      |      |       |      |      |
| Service Time               | 5.169 | 7.231 | 6.983 | 4.748 |      |      |       |      |      |       |      |      |
| HCM Lane V/C Ratio         | 1.249 | 0.418 | 0.498 | 1.35  |      |      |       |      |      |       |      |      |
| HCM Control Delay          | 118.6 | 17.6  | 19    | 171.9 |      |      |       |      |      |       |      |      |
| HCM Lane LOS               | F     | C     | C     | F     |      |      |       |      |      |       |      |      |
| HCM 95th-ile Q             | 20.8  | 1.7   | 2.2   | 29.3  |      |      |       |      |      |       |      |      |

12239.00 :: Needham Street  
2: Chestnut Street & Route 9 EB Access Road

2025 Build Conditions without Shuttle Service  
Timing Plan: Weekday Evening

| Intersection               |      |      |      |      |      |      |      |      |      |       |      |      |
|----------------------------|------|------|------|------|------|------|------|------|------|-------|------|------|
| Intersection Delay, s/veh  | 66.9 |      |      |      |      |      |      |      |      |       |      |      |
| Intersection LOS           | F    |      |      |      |      |      |      |      |      |       |      |      |
| Movement                   | EBL  | EBT  | EBR  | WBL  | WBT  | WBR  | NBL  | NBT  | NBR  | SBL   | SBT  | SBR  |
| Lane Configurations        | ↔    |      |      | ↔    |      |      | ↔    |      |      | ↔     |      |      |
| Traffic Vol, veh/h         | 180  | 155  | 15   | 1    | 2    | 20   | 2    | 385  | 35   | 100   | 505  | 2    |
| Future Vol, veh/h          | 180  | 155  | 15   | 1    | 2    | 20   | 2    | 385  | 35   | 100   | 505  | 2    |
| Peak Hour Factor           | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92  | 0.92 | 0.92 |
| Heavy Vehicles, %          | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0     | 0    | 0    |
| Mvmt Flow                  | 196  | 168  | 16   | 1    | 2    | 22   | 2    | 418  | 38   | 109   | 549  | 2    |
| Number of Lanes            | 0    | 1    | 0    | 0    | 1    | 0    | 0    | 1    | 0    | 0     | 1    | 0    |
| Approach                   | EB   |      |      | WB   |      |      | NB   |      |      | SB    |      |      |
| Opposing Approach          | WB   |      |      | EB   |      |      | SB   |      |      | NB    |      |      |
| Opposing Lanes             | 1    |      |      | 1    |      |      | 1    |      |      | 1     |      |      |
| Conflicting Approach Left  | SB   |      |      | NB   |      |      | EB   |      |      | WB    |      |      |
| Conflicting Lanes Left     | 1    |      |      | 1    |      |      | 1    |      |      | 1     |      |      |
| Conflicting Approach Right | NB   |      |      | SB   |      |      | WB   |      |      | EB    |      |      |
| Conflicting Lanes Right    | 1    |      |      | 1    |      |      | 1    |      |      | 1     |      |      |
| HCM Control Delay          | 27.9 |      |      | 12   |      |      | 33.4 |      |      | 114.8 |      |      |
| HCM LOS                    | D    |      |      | B    |      |      | D    |      |      | F     |      |      |

| Lane                   | NBLn1 | EBLn1 | WBLn1 | SBLn1 |
|------------------------|-------|-------|-------|-------|
| Vol Left, %            | 0%    | 51%   | 4%    | 16%   |
| Vol Thru, %            | 91%   | 44%   | 9%    | 83%   |
| Vol Right, %           | 8%    | 4%    | 87%   | 0%    |
| Sign Control           | Stop  | Stop  | Stop  | Stop  |
| Traffic Vol by Lane    | 422   | 350   | 23    | 607   |
| LT Vol                 | 2     | 180   | 1     | 100   |
| Through Vol            | 385   | 155   | 2     | 505   |
| RT Vol                 | 35    | 15    | 20    | 2     |
| Lane Flow Rate         | 459   | 380   | 25    | 660   |
| Geometry Grp           | 1     | 1     | 1     | 1     |
| Degree of Util (X)     | 0.818 | 0.733 | 0.055 | 1.163 |
| Departure Headway (Hd) | 6.78  | 7.35  | 8.502 | 6.345 |
| Convergence, Y/N       | Yes   | Yes   | Yes   | Yes   |
| Cap                    | 537   | 495   | 424   | 567   |
| Service Time           | 4.78  | 5.35  | 6.502 | 4.443 |
| HCM Lane V/C Ratio     | 0.855 | 0.768 | 0.059 | 1.154 |
| HCM Control Delay      | 33.4  | 27.9  | 12    | 114.8 |
| HCM Lane LOS           | D     | D     | B     | F     |
| HCM 95th-tile Q        | 8.1   | 6     | 0.2   | 22.3  |

12239.00 :: Needham Street  
3: Chestnut Street & Elliot Street

2025 Build Conditions without Shuttle Service  
Timing Plan: Weekday Evening

|                         |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|-------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
| Lane Group              | EBL                                                                                 | EBT                                                                                 | EBR                                                                                 | WBL                                                                                 | WBT                                                                                 | WBR                                                                                 | NBL                                                                                 | NBT                                                                                 | NBR                                                                                 | SBL                                                                                 | SBT                                                                                 | SBR                                                                                 | Ø3                                                                                  |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Lane Configurations     | ↔                                                                                   |                                                                                     |                                                                                     | ↔                                                                                   |                                                                                     |                                                                                     | ↔                                                                                   |                                                                                     |                                                                                     | ↔                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Traffic Volume (vph)    | 165                                                                                 | 245                                                                                 | 55                                                                                  | 10                                                                                  | 195                                                                                 | 45                                                                                  | 90                                                                                  | 285                                                                                 | 5                                                                                   | 60                                                                                  | 340                                                                                 | 315                                                                                 |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Future Volume (vph)     | 165                                                                                 | 245                                                                                 | 55                                                                                  | 10                                                                                  | 195                                                                                 | 45                                                                                  | 90                                                                                  | 285                                                                                 | 5                                                                                   | 60                                                                                  | 340                                                                                 | 315                                                                                 |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Ideal Flow (vphpl)      | 1900                                                                                | 1900                                                                                | 1900                                                                                | 1900                                                                                | 1900                                                                                | 1900                                                                                | 1900                                                                                | 1900                                                                                | 1900                                                                                | 1900                                                                                | 1900                                                                                | 1900                                                                                |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Satd. Flow (prot)       | 0                                                                                   | 1833                                                                                | 0                                                                                   | 0                                                                                   | 1843                                                                                | 0                                                                                   | 0                                                                                   | 1873                                                                                | 0                                                                                   | 0                                                                                   | 1763                                                                                | 0                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Flt Permitted           |                                                                                     | 0.661                                                                               |                                                                                     |                                                                                     | 0.978                                                                               |                                                                                     |                                                                                     | 0.665                                                                               |                                                                                     |                                                                                     | 0.932                                                                               |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Satd. Flow (perm)       | 0                                                                                   | 1231                                                                                | 0                                                                                   | 0                                                                                   | 1806                                                                                | 0                                                                                   | 0                                                                                   | 1260                                                                                | 0                                                                                   | 0                                                                                   | 1649                                                                                | 0                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Right Turn on Red       | Yes                                                                                 |                                                                                     |                                                                                     | Yes                                                                                 |                                                                                     |                                                                                     | Yes                                                                                 |                                                                                     |                                                                                     | Yes                                                                                 |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Satd. Flow (RTOR)       | 6                                                                                   |                                                                                     |                                                                                     | 10                                                                                  |                                                                                     |                                                                                     | 1                                                                                   |                                                                                     |                                                                                     | 48                                                                                  |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Link Speed (mph)        | 30                                                                                  |                                                                                     |                                                                                     | 30                                                                                  |                                                                                     |                                                                                     | 30                                                                                  |                                                                                     |                                                                                     | 30                                                                                  |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Link Distance (ft)      | 764                                                                                 |                                                                                     |                                                                                     | 972                                                                                 |                                                                                     |                                                                                     | 2055                                                                                |                                                                                     |                                                                                     | 1553                                                                                |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Travel Time (s)         | 17.4                                                                                |                                                                                     |                                                                                     | 22.1                                                                                |                                                                                     |                                                                                     | 46.7                                                                                |                                                                                     |                                                                                     | 35.3                                                                                |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Confl. Peds. (#/hr)     | 2                                                                                   |                                                                                     | 2                                                                                   | 2                                                                                   | 2                                                                                   |                                                                                     | 3                                                                                   | 2                                                                                   |                                                                                     | 5                                                                                   | 5                                                                                   | 3                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Peak Hour Factor        | 0.92                                                                                | 0.92                                                                                | 0.92                                                                                | 0.92                                                                                | 0.92                                                                                | 0.92                                                                                | 0.92                                                                                | 0.92                                                                                | 0.92                                                                                | 0.92                                                                                | 0.92                                                                                | 0.92                                                                                |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Heavy Vehicles (%)      | 0%                                                                                  | 0%                                                                                  | 0%                                                                                  | 0%                                                                                  | 0%                                                                                  | 0%                                                                                  | 0%                                                                                  | 0%                                                                                  | 0%                                                                                  | 0%                                                                                  | 0%                                                                                  | 0%                                                                                  |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Shared Lane Traffic (%) |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Lane Group Flow (vph)   | 0                                                                                   | 505                                                                                 | 0                                                                                   | 0                                                                                   | 272                                                                                 | 0                                                                                   | 0                                                                                   | 413                                                                                 | 0                                                                                   | 0                                                                                   | 777                                                                                 | 0                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Turn Type               | Perm                                                                                | NA                                                                                  |                                                                                     | Perm                                                                                | NA                                                                                  |                                                                                     | Perm                                                                                | NA                                                                                  |                                                                                     | Perm                                                                                | NA                                                                                  |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Protected Phases        | 1                                                                                   |                                                                                     |                                                                                     | 1                                                                                   |                                                                                     |                                                                                     | 2                                                                                   |                                                                                     |                                                                                     | 2                                                                                   |                                                                                     |                                                                                     | 3                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Permitted Phases        | 1                                                                                   |                                                                                     |                                                                                     | 1                                                                                   |                                                                                     |                                                                                     | 2                                                                                   |                                                                                     |                                                                                     | 2                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Detector Phase          | 1                                                                                   |                                                                                     | 1                                                                                   |                                                                                     | 1                                                                                   | 1                                                                                   | 2                                                                                   |                                                                                     | 2                                                                                   | 2                                                                                   |                                                                                     | 2                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Switch Phase            |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Minimum Initial (s)     | 6.0                                                                                 | 6.0                                                                                 |                                                                                     | 6.0                                                                                 | 6.0                                                                                 |                                                                                     | 6.0                                                                                 | 6.0                                                                                 |                                                                                     | 6.0                                                                                 | 6.0                                                                                 |                                                                                     | 4.0                                                                                 |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Minimum Split (s)       | 11.0                                                                                | 11.0                                                                                |                                                                                     | 11.0                                                                                | 11.0                                                                                |                                                                                     | 11.0                                                                                | 11.0                                                                                |                                                                                     | 11.0                                                                                | 11.0                                                                                |                                                                                     | 19.0                                                                                |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Total Split (s)         | 35.0                                                                                | 35.0                                                                                |                                                                                     | 35.0                                                                                | 35.0                                                                                |                                                                                     | 35.0                                                                                | 35.0                                                                                |                                                                                     | 35.0                                                                                | 35.0                                                                                |                                                                                     | 19.0                                                                                |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Total Split (%)         | 32.1%                                                                               | 32.1%                                                                               |                                                                                     | 32.1%                                                                               | 32.1%                                                                               |                                                                                     | 50.5%                                                                               | 50.5%                                                                               |                                                                                     | 50.5%                                                                               | 50.5%                                                                               |                                                                                     | 17%                                                                                 |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Yellow Time (s)         | 3.0                                                                                 | 3.0                                                                                 |                                                                                     | 3.0                                                                                 | 3.0                                                                                 |                                                                                     | 3.0                                                                                 | 3.0                                                                                 |                                                                                     | 3.0                                                                                 | 3.0                                                                                 |                                                                                     | 3.0                                                                                 |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| All-Red Time (s)        | 2.0                                                                                 | 2.0                                                                                 |                                                                                     | 2.0                                                                                 | 2.0                                                                                 |                                                                                     | 2.0                                                                                 | 2.0                                                                                 |                                                                                     | 2.0                                                                                 | 2.0                                                                                 |                                                                                     | 1.0                                                                                 |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Lost Time Adjust (s)    | 0.0                                                                                 |                                                                                     |                                                                                     | 0.0                                                                                 |                                                                                     |                                                                                     | 0.0                                                                                 |                                                                                     |                                                                                     | 0.0                                                                                 |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Total Lost Time (s)     | 5.0                                                                                 |                                                                                     |                                                                                     | 5.0                                                                                 |                                                                                     |                                                                                     | 5.0                                                                                 |                                                                                     |                                                                                     | 5.0                                                                                 |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Lead/Lag                | Lead                                                                                | Lead                                                                                |                                                                                     | Lead                                                                                | Lead                                                                                |                                                                                     | Lag                                                                                 | Lag                                                                                 |                                                                                     | Lag                                                                                 | Lag                                                                                 |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Lead-Lag Optimize?      |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Recall Mode             | None                                                                                | None                                                                                |                                                                                     | None                                                                                | None                                                                                |                                                                                     | None                                                                                | None                                                                                |                                                                                     | None                                                                                | None                                                                                |                                                                                     | None                                                                                |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Act Effect Green (s)    | 30.2                                                                                |                                                                                     |                                                                                     | 30.2                                                                                |                                                                                     |                                                                                     | 49.6                                                                                |                                                                                     |                                                                                     | 49.6                                                                                |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Actuated g/C Ratio      | 0.32                                                                                |                                                                                     |                                                                                     | 0.32                                                                                |                                                                                     |                                                                                     | 0.53                                                                                |                                                                                     |                                                                                     | 0.53                                                                                |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| v/c Ratio               | 1.25                                                                                |                                                                                     |                                                                                     | 0.46                                                                                |                                                                                     |                                                                                     | 0.62                                                                                |                                                                                     |                                                                                     | 0.86                                                                                |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Control Delay           | 162.5                                                                               |                                                                                     |                                                                                     | 28.5                                                                                |                                                                                     |                                                                                     | 21.6                                                                                |                                                                                     |                                                                                     | 30.6                                                                                |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Queue Delay             | 0.0                                                                                 |                                                                                     |                                                                                     | 0.0                                                                                 |                                                                                     |                                                                                     | 0.0                                                                                 |                                                                                     |                                                                                     | 0.0                                                                                 |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Total Delay             | 162.5                                                                               |                                                                                     |                                                                                     | 28.5                                                                                |                                                                                     |                                                                                     | 21.6                                                                                |                                                                                     |                                                                                     | 30.6                                                                                |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| LOS                     | F                                                                                   |                                                                                     |                                                                                     | C                                                                                   |                                                                                     |                                                                                     | C                                                                                   |                                                                                     |                                                                                     | C                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Approach Delay          | 162.5                                                                               |                                                                                     |                                                                                     | 28.5                                                                                |                                                                                     |                                                                                     | 21.6                                                                                |                                                                                     |                                                                                     | 30.6                                                                                |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Approach LOS            | F                                                                                   |                                                                                     |                                                                                     | C                                                                                   |                                                                                     |                                                                                     | C                                                                                   |                                                                                     |                                                                                     | C                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Queue Length 50th (ft)  | ~356                                                                                |                                                                                     |                                                                                     | 115                                                                                 |                                                                                     |                                                                                     | 145                                                                                 |                                                                                     |                                                                                     | 322                                                                                 |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Queue Length 95th (ft)  | #696                                                                                |                                                                                     |                                                                                     | 241                                                                                 |                                                                                     |                                                                                     | 353                                                                                 |                                                                                     |                                                                                     | #781                                                                                |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Internal Link Dist (ft) | 684                                                                                 |                                                                                     |                                                                                     | 892                                                                                 |                                                                                     |                                                                                     | 1975                                                                                |                                                                                     |                                                                                     | 1473                                                                                |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Turn Bay Length (ft)    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Base Capacity (vph)     | 403                                                                                 |                                                                                     |                                                                                     | 592                                                                                 |                                                                                     |                                                                                     | 682                                                                                 |                                                                                     |                                                                                     | 914                                                                                 |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Starvation Cap Reductn  | 0                                                                                   |                                                                                     |                                                                                     | 0                                                                                   |                                                                                     |                                                                                     | 0                                                                                   |                                                                                     |                                                                                     | 0                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Spillback Cap Reductn   | 0                                                                                   |                                                                                     |                                                                                     | 0                                                                                   |                                                                                     |                                                                                     | 0                                                                                   |                                                                                     |                                                                                     | 0                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Storage Cap Reductn     | 0                                                                                   |                                                                                     |                                                                                     | 0                                                                                   |                                                                                     |                                                                                     | 0                                                                                   |                                                                                     |                                                                                     | 0                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Reduced v/c Ratio       | 1.25                                                                                |                                                                                     |                                                                                     | 0.46                                                                                |                                                                                     |                                                                                     | 0.61                                                                                |                                                                                     |                                                                                     | 0.85                                                                                |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |

| Intersection Summary                                            |                        |  |
|-----------------------------------------------------------------|------------------------|--|
| Area Type:                                                      | Other                  |  |
| Cycle Length: 109                                               |                        |  |
| Actuated Cycle Length: 93.1                                     |                        |  |
| Natural Cycle: 150                                              |                        |  |
| Control Type: Actuated-Uncoordinated                            |                        |  |
| Maximum v/c Ratio: 1.25                                         |                        |  |
| Intersection Signal Delay: 62.3                                 | Intersection LOS: E    |  |
| Intersection Capacity Utilization 95.7%                         | ICU Level of Service F |  |
| Analysis Period (min) 15                                        |                        |  |
| ~ Volume exceeds capacity, queue is theoretically infinite.     |                        |  |
| Queue shown is maximum after two cycles.                        |                        |  |
| # 95th percentile volume exceeds capacity, queue may be longer. |                        |  |
| Queue shown is maximum after two cycles.                        |                        |  |



12239.00 :: Needham Street  
4: Oak Street & Chestnut Street

2025 Build Conditions without Shuttle Service  
Timing Plan: Weekday Evening

|                         |  |  |  |  |  |  |  |  |  |  |  |  |  |
|-------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|
| Lane Group              | EBL                                                                               | EBT                                                                               | EBR                                                                               | WBL                                                                               | WBT                                                                               | WBR                                                                               | NBL                                                                               | NBT                                                                               | NBR                                                                               | SBL                                                                               | SBT                                                                               | SBR                                                                               | Ø3                                                                                |
| Lane Configurations     |  |                                                                                   |                                                                                   |  |                                                                                   |                                                                                   |  |                                                                                   |                                                                                   |  |                                                                                   |                                                                                   |                                                                                   |
| Traffic Volume (vph)    | 20                                                                                | 15                                                                                | 300                                                                               | 35                                                                                | 25                                                                                | 5                                                                                 | 345                                                                               | 110                                                                               | 15                                                                                | 5                                                                                 | 135                                                                               | 20                                                                                |                                                                                   |
| Future Volume (vph)     | 20                                                                                | 15                                                                                | 300                                                                               | 35                                                                                | 25                                                                                | 5                                                                                 | 345                                                                               | 110                                                                               | 15                                                                                | 5                                                                                 | 135                                                                               | 20                                                                                |                                                                                   |
| Ideal Flow (vphpl)      | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                              |                                                                                   |
| Satd. Flow (prot)       | 0                                                                                 | 1628                                                                              | 0                                                                                 | 0                                                                                 | 1829                                                                              | 0                                                                                 | 0                                                                                 | 1807                                                                              | 0                                                                                 | 0                                                                                 | 1841                                                                              | 0                                                                                 |                                                                                   |
| Flt Permitted           |                                                                                   | 0.977                                                                             |                                                                                   |                                                                                   | 0.405                                                                             |                                                                                   |                                                                                   | 0.676                                                                             |                                                                                   |                                                                                   | 0.987                                                                             |                                                                                   |                                                                                   |
| Satd. Flow (perm)       | 0                                                                                 | 1595                                                                              | 0                                                                                 | 0                                                                                 | 760                                                                               | 0                                                                                 | 0                                                                                 | 1261                                                                              | 0                                                                                 | 0                                                                                 | 1819                                                                              | 0                                                                                 |                                                                                   |
| Right Turn on Red       |                                                                                   |                                                                                   | Yes                                                                               |                                                                                   |                                                                                   | Yes                                                                               |                                                                                   |                                                                                   | Yes                                                                               |                                                                                   |                                                                                   | Yes                                                                               |                                                                                   |
| Satd. Flow (RTOR)       | 326                                                                               |                                                                                   |                                                                                   | 4                                                                                 |                                                                                   |                                                                                   | 2                                                                                 |                                                                                   |                                                                                   | 8                                                                                 |                                                                                   |                                                                                   |                                                                                   |
| Link Speed (mph)        | 30                                                                                |                                                                                   |                                                                                   | 30                                                                                |                                                                                   |                                                                                   | 30                                                                                |                                                                                   |                                                                                   | 30                                                                                |                                                                                   |                                                                                   |                                                                                   |
| Link Distance (ft)      | 2055                                                                              |                                                                                   |                                                                                   | 492                                                                               |                                                                                   |                                                                                   | 226                                                                               |                                                                                   |                                                                                   | 762                                                                               |                                                                                   |                                                                                   |                                                                                   |
| Travel Time (s)         | 46.7                                                                              |                                                                                   |                                                                                   | 11.2                                                                              |                                                                                   |                                                                                   | 5.1                                                                               |                                                                                   |                                                                                   | 17.3                                                                              |                                                                                   |                                                                                   |                                                                                   |
| Confl. Peds. (#/hr)     | 2                                                                                 |                                                                                   | 3                                                                                 | 3                                                                                 |                                                                                   | 2                                                                                 | 4                                                                                 |                                                                                   | 4                                                                                 | 4                                                                                 |                                                                                   | 4                                                                                 |                                                                                   |
| Peak Hour Factor        | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              |                                                                                   |
| Heavy Vehicles (%)      | 0%                                                                                | 0%                                                                                | 0%                                                                                | 0%                                                                                | 0%                                                                                | 0%                                                                                | 1%                                                                                | 1%                                                                                | 1%                                                                                | 1%                                                                                | 1%                                                                                | 1%                                                                                |                                                                                   |
| Shared Lane Traffic (%) |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| Lane Group Flow (vph)   | 0                                                                                 | 364                                                                               | 0                                                                                 | 0                                                                                 | 70                                                                                | 0                                                                                 | 0                                                                                 | 511                                                                               | 0                                                                                 | 0                                                                                 | 174                                                                               | 0                                                                                 |                                                                                   |
| Turn Type               | Perm                                                                              | NA                                                                                |                                                                                   | Perm                                                                              | NA                                                                                |                                                                                   | Perm                                                                              | NA                                                                                |                                                                                   | Perm                                                                              | NA                                                                                |                                                                                   |                                                                                   |
| Protected Phases        | 1                                                                                 |                                                                                   |                                                                                   | 1                                                                                 |                                                                                   |                                                                                   | 2                                                                                 |                                                                                   |                                                                                   | 2                                                                                 |                                                                                   |                                                                                   | 3                                                                                 |
| Permitted Phases        | 1                                                                                 |                                                                                   |                                                                                   | 1                                                                                 |                                                                                   |                                                                                   | 2                                                                                 |                                                                                   |                                                                                   | 2                                                                                 |                                                                                   |                                                                                   |                                                                                   |
| Detector Phase          | 1                                                                                 | 1                                                                                 |                                                                                   | 1                                                                                 |                                                                                   | 1                                                                                 | 2                                                                                 |                                                                                   | 2                                                                                 | 2                                                                                 |                                                                                   | 2                                                                                 |                                                                                   |
| Switch Phase            |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| Minimum Initial (s)     | 8.0                                                                               | 8.0                                                                               |                                                                                   | 8.0                                                                               | 8.0                                                                               |                                                                                   | 8.0                                                                               | 8.0                                                                               |                                                                                   | 8.0                                                                               | 8.0                                                                               |                                                                                   | 8.0                                                                               |
| Minimum Split (s)       | 13.0                                                                              | 13.0                                                                              |                                                                                   | 13.0                                                                              | 13.0                                                                              |                                                                                   | 14.0                                                                              | 14.0                                                                              |                                                                                   | 14.0                                                                              | 14.0                                                                              |                                                                                   | 18.0                                                                              |
| Total Split (s)         | 35.0                                                                              | 35.0                                                                              |                                                                                   | 35.0                                                                              | 35.0                                                                              |                                                                                   | 36.0                                                                              | 36.0                                                                              |                                                                                   | 36.0                                                                              | 36.0                                                                              |                                                                                   | 25.0                                                                              |
| Total Split (%)         | 36.5%                                                                             | 36.5%                                                                             |                                                                                   | 36.5%                                                                             | 36.5%                                                                             |                                                                                   | 37.5%                                                                             | 37.5%                                                                             |                                                                                   | 37.5%                                                                             | 37.5%                                                                             |                                                                                   | 26%                                                                               |
| Yellow Time (s)         | 4.0                                                                               | 4.0                                                                               |                                                                                   | 4.0                                                                               | 4.0                                                                               |                                                                                   | 4.0                                                                               | 4.0                                                                               |                                                                                   | 4.0                                                                               | 4.0                                                                               |                                                                                   | 4.0                                                                               |
| All-Red Time (s)        | 1.0                                                                               | 1.0                                                                               |                                                                                   | 1.0                                                                               | 1.0                                                                               |                                                                                   | 2.0                                                                               | 2.0                                                                               |                                                                                   | 2.0                                                                               | 2.0                                                                               |                                                                                   | 1.0                                                                               |
| Lost Time Adjust (s)    | 0.0                                                                               |                                                                                   |                                                                                   | 0.0                                                                               |                                                                                   |                                                                                   | 0.0                                                                               |                                                                                   |                                                                                   | 0.0                                                                               |                                                                                   |                                                                                   |                                                                                   |
| Total Lost Time (s)     | 5.0                                                                               |                                                                                   |                                                                                   | 5.0                                                                               |                                                                                   |                                                                                   | 6.0                                                                               |                                                                                   |                                                                                   | 6.0                                                                               |                                                                                   |                                                                                   |                                                                                   |
| Lead/Lag                | Lead                                                                              | Lead                                                                              |                                                                                   | Lead                                                                              | Lead                                                                              |                                                                                   | Lag                                                                               | Lag                                                                               |                                                                                   | Lag                                                                               | Lag                                                                               |                                                                                   |                                                                                   |
| Lead-Lag Optimize?      |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| Recall Mode             | Min                                                                               | Min                                                                               |                                                                                   | Min                                                                               | Min                                                                               |                                                                                   | Min                                                                               | Min                                                                               |                                                                                   | Min                                                                               | Min                                                                               |                                                                                   | None                                                                              |
| Act Effect Green (s)    | 11.0                                                                              |                                                                                   |                                                                                   | 11.0                                                                              |                                                                                   |                                                                                   | 31.0                                                                              |                                                                                   |                                                                                   | 31.0                                                                              |                                                                                   |                                                                                   |                                                                                   |
| Actuated g/C Ratio      | 0.20                                                                              |                                                                                   |                                                                                   | 0.20                                                                              |                                                                                   |                                                                                   | 0.55                                                                              |                                                                                   |                                                                                   | 0.55                                                                              |                                                                                   |                                                                                   |                                                                                   |
| v/c Ratio               | 0.63                                                                              |                                                                                   |                                                                                   | 0.46                                                                              |                                                                                   |                                                                                   | 0.73                                                                              |                                                                                   |                                                                                   | 0.17                                                                              |                                                                                   |                                                                                   |                                                                                   |
| Control Delay           | 9.8                                                                               |                                                                                   |                                                                                   | 30.5                                                                              |                                                                                   |                                                                                   | 21.8                                                                              |                                                                                   |                                                                                   | 9.3                                                                               |                                                                                   |                                                                                   |                                                                                   |
| Queue Delay             | 0.0                                                                               |                                                                                   |                                                                                   | 0.0                                                                               |                                                                                   |                                                                                   | 0.0                                                                               |                                                                                   |                                                                                   | 0.0                                                                               |                                                                                   |                                                                                   |                                                                                   |
| Total Delay             | 9.8                                                                               |                                                                                   |                                                                                   | 30.5                                                                              |                                                                                   |                                                                                   | 21.8                                                                              |                                                                                   |                                                                                   | 9.3                                                                               |                                                                                   |                                                                                   |                                                                                   |
| LOS                     | A                                                                                 |                                                                                   |                                                                                   | C                                                                                 |                                                                                   |                                                                                   | C                                                                                 |                                                                                   |                                                                                   | A                                                                                 |                                                                                   |                                                                                   |                                                                                   |
| Approach Delay          | 9.8                                                                               |                                                                                   |                                                                                   | 30.5                                                                              |                                                                                   |                                                                                   | 21.8                                                                              |                                                                                   |                                                                                   | 9.3                                                                               |                                                                                   |                                                                                   |                                                                                   |
| Approach LOS            | A                                                                                 |                                                                                   |                                                                                   | C                                                                                 |                                                                                   |                                                                                   | C                                                                                 |                                                                                   |                                                                                   | A                                                                                 |                                                                                   |                                                                                   |                                                                                   |
| Queue Length 50th (ft)  | 9                                                                                 |                                                                                   |                                                                                   | 18                                                                                |                                                                                   |                                                                                   | 88                                                                                |                                                                                   |                                                                                   | 19                                                                                |                                                                                   |                                                                                   |                                                                                   |
| Queue Length 95th (ft)  | 85                                                                                |                                                                                   |                                                                                   | 65                                                                                |                                                                                   |                                                                                   | #471                                                                              |                                                                                   |                                                                                   | 99                                                                                |                                                                                   |                                                                                   |                                                                                   |
| Internal Link Dist (ft) | 1975                                                                              |                                                                                   |                                                                                   | 412                                                                               |                                                                                   |                                                                                   | 146                                                                               |                                                                                   |                                                                                   | 682                                                                               |                                                                                   |                                                                                   |                                                                                   |
| Turn Bay Length (ft)    |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| Base Capacity (vph)     | 1029                                                                              |                                                                                   |                                                                                   | 422                                                                               |                                                                                   |                                                                                   | 699                                                                               |                                                                                   |                                                                                   | 1011                                                                              |                                                                                   |                                                                                   |                                                                                   |
| Starvation Cap Reductn  | 0                                                                                 |                                                                                   |                                                                                   | 0                                                                                 |                                                                                   |                                                                                   | 0                                                                                 |                                                                                   |                                                                                   | 0                                                                                 |                                                                                   |                                                                                   |                                                                                   |
| Spillback Cap Reductn   | 0                                                                                 |                                                                                   |                                                                                   | 0                                                                                 |                                                                                   |                                                                                   | 0                                                                                 |                                                                                   |                                                                                   | 0                                                                                 |                                                                                   |                                                                                   |                                                                                   |
| Storage Cap Reductn     | 0                                                                                 |                                                                                   |                                                                                   | 0                                                                                 |                                                                                   |                                                                                   | 0                                                                                 |                                                                                   |                                                                                   | 0                                                                                 |                                                                                   |                                                                                   |                                                                                   |
| Reduced v/c Ratio       | 0.35                                                                              |                                                                                   |                                                                                   | 0.17                                                                              |                                                                                   |                                                                                   | 0.73                                                                              |                                                                                   |                                                                                   | 0.17                                                                              |                                                                                   |                                                                                   |                                                                                   |

|                                                                 |  |  |  |  |  |  |  |  |  |  |  |  |  |
|-----------------------------------------------------------------|--|--|--|--|--|--|--|--|--|--|--|--|--|
| Intersection Summary                                            |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Area Type: Other                                                |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Cycle Length: 96                                                |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Actuated Cycle Length: 56                                       |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Natural Cycle: 70                                               |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Control Type: Actuated-Uncoordinated                            |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Maximum v/c Ratio: 0.73                                         |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Intersection Signal Delay: 16.5                                 |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Intersection Capacity Utilization 69.3%                         |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Analysis Period (min) 15                                        |  |  |  |  |  |  |  |  |  |  |  |  |  |
| # 95th percentile volume exceeds capacity, queue may be longer. |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Queue shown is maximum after two cycles.                        |  |  |  |  |  |  |  |  |  |  |  |  |  |



12239.00 :: Needham Street  
5: Oak Street & Site Driveway

2025 Build Conditions without Shuttle Service  
Timing Plan: Weekday Evening

|                          |      |      |      |      |      |      |
|--------------------------|------|------|------|------|------|------|
| Intersection             |      |      |      |      |      |      |
| Int Delay, s/veh         | 3.8  |      |      |      |      |      |
| Movement                 | WBL  | WBR  | NBT  | NBR  | SBL  | SBT  |
| Lane Configurations      | ↔    |      | ↔    |      | ↔    | ↔    |
| Traffic Vol, veh/h       | 75   | 65   | 405  | 60   | 55   | 415  |
| Future Vol, veh/h        | 75   | 65   | 405  | 60   | 55   | 415  |
| Conflicting Peds, #/hr   | 0    | 0    | 0    | 6    | 6    | 0    |
| Sign Control             | Stop | Stop | Free | Free | Free | Free |
| RT Channelized           | -    | None | -    | None | -    | None |
| Storage Length           | 0    | -    | -    | -    | -    | -    |
| Veh in Median Storage, # | 0    | -    | 0    | -    | -    | -    |
| Grade, %                 | 0    | -    | 0    | -    | -    | 0    |
| Peak Hour Factor         | 92   | 92   | 92   | 92   | 92   | 92   |
| Heavy Vehicles, %        | 0    | 0    | 1    | 1    | 1    | 1    |
| Mvmt Flow                | 82   | 71   | 440  | 65   | 60   | 451  |

|                      |        |        |        |       |
|----------------------|--------|--------|--------|-------|
| Major/Minor          | Minor1 | Major1 | Major2 |       |
| Conflicting Flow All | 1050   | 479    | 0      | 511   |
| Stage 1              | 479    | -      | -      | -     |
| Stage 2              | 571    | -      | -      | -     |
| Critical Hdwy        | 6.4    | 6.2    | -      | 4.11  |
| Critical Hdwy Stg 1  | 5.4    | -      | -      | -     |
| Critical Hdwy Stg 2  | 5.4    | -      | -      | -     |
| Follow-up Hdwy       | 3.5    | 3.3    | -      | 2.209 |
| Pot Cap-1 Maneuver   | 254    | 591    | -      | 1059  |
| Stage 1              | 627    | -      | -      | -     |
| Stage 2              | 569    | -      | -      | -     |
| Platoon blocked, %   |        | -      | -      | -     |
| Mov Cap-1 Maneuver   | 234    | 588    | -      | 1059  |
| Mov Cap-2 Maneuver   | 234    | -      | -      | -     |
| Stage 1              | 624    | -      | -      | -     |
| Stage 2              | 526    | -      | -      | -     |

|                      |      |    |    |
|----------------------|------|----|----|
| Approach             | WB   | NB | SB |
| HCM Control Delay, s | 25.5 | 0  | 1  |
| HCM LOS              | D    |    |    |

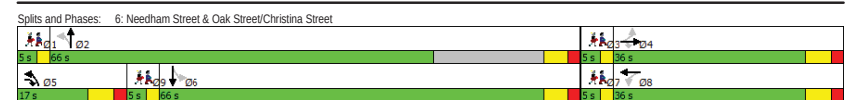
|                       |     |     |       |       |     |
|-----------------------|-----|-----|-------|-------|-----|
| Minor Lane/Major Mvmt | NBT | NBR | WBLn1 | SBL   | SBT |
| Capacity (veh/h)      | -   | -   | 325   | 1059  | -   |
| HCM Lane V/C Ratio    | -   | -   | 0.468 | 0.056 | -   |
| HCM Control Delay (s) | -   | -   | 25.5  | 8.6   | 0   |
| HCM Lane LOS          | -   | -   | D     | A     | A   |
| HCM 95th %ile Q(veh)  | -   | -   | 2.4   | 0.2   | -   |



2025 Build Conditions without Shuttle Service  
Timing Plan: Weekday Evening

| Intersection Summary                                                                                    |                                                               |
|---------------------------------------------------------------------------------------------------------|---------------------------------------------------------------|
| Area Type:                                                                                              | Other                                                         |
| Cycle Length:                                                                                           | 129                                                           |
| Actuated Cycle Length:                                                                                  | 120                                                           |
| Natural Cycle:                                                                                          | 150                                                           |
| Control Type:                                                                                           | Actuated-Uncoordinated                                        |
| Maximum v/c Ratio:                                                                                      | 1.19                                                          |
| Intersection Signal Delay:                                                                              | 70.2                                                          |
| Intersection Capacity Utilization:                                                                      | 108.6%                                                        |
| Analysis Period (min):                                                                                  | 15                                                            |
| ~ Volume exceeds capacity, queue is theoretically infinite.<br>Queue shown is maximum after two cycles. |                                                               |
| #                                                                                                       | 95th percentile volume exceeds capacity, queue may be longer. |
| Queue shown is maximum after two cycles.                                                                |                                                               |

2025 Build Conditions without Shuttle Service  
Timing Plan: Weekday Evening



12239.00 :: Needham Street  
7: Needham Street & South Site Driveway

2025 Build Conditions without Shuttle Service  
Timing Plan: Weekday Evening

| Intersection             |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
|--------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|
| Int Delay, s/veh         | 4.1                                                                               |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| Movement                 | EBL                                                                               | EBR                                                                               | NBL                                                                               | NBT                                                                               | SBT                                                                               | SBR                                                                               |
| Lane Configurations      |  |  |  |  |  |  |
| Traffic Vol, veh/h       | 10                                                                                | 145                                                                               | 40                                                                                | 980                                                                               | 865                                                                               | 45                                                                                |
| Future Vol, veh/h        | 10                                                                                | 145                                                                               | 40                                                                                | 980                                                                               | 865                                                                               | 45                                                                                |
| Conflicting Peds, #/hr   | 0                                                                                 | 0                                                                                 | 7                                                                                 | 0                                                                                 | 0                                                                                 | 7                                                                                 |
| Sign Control             | Stop                                                                              | Stop                                                                              | Free                                                                              | Free                                                                              | Free                                                                              | Free                                                                              |
| RT Channelized           | -                                                                                 | None                                                                              | -                                                                                 | None                                                                              | -                                                                                 | None                                                                              |
| Storage Length           | 0                                                                                 | -                                                                                 | 50                                                                                | -                                                                                 | -                                                                                 | -                                                                                 |
| Veh in Median Storage, # | 0                                                                                 | -                                                                                 | -                                                                                 | 0                                                                                 | 0                                                                                 | -                                                                                 |
| Grade, %                 | 0                                                                                 | -                                                                                 | -                                                                                 | 0                                                                                 | 0                                                                                 | -                                                                                 |
| Peak Hour Factor         | 92                                                                                | 92                                                                                | 92                                                                                | 92                                                                                | 92                                                                                | 92                                                                                |
| Heavy Vehicles, %        | 0                                                                                 | 0                                                                                 | 1                                                                                 | 1                                                                                 | 1                                                                                 | 1                                                                                 |
| Mvmt Flow                | 11                                                                                | 158                                                                               | 43                                                                                | 1065                                                                              | 940                                                                               | 49                                                                                |
| Major/Minor              |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
|                          | Minor2                                                                            | Major1                                                                            |                                                                                   | Major2                                                                            |                                                                                   |                                                                                   |
| Conflicting Flow All     | 2124                                                                              | 972                                                                               | 996                                                                               | 0                                                                                 | -                                                                                 | 0                                                                                 |
| Stage 1                  | 972                                                                               | -                                                                                 | -                                                                                 | -                                                                                 | -                                                                                 | -                                                                                 |
| Stage 2                  | 1152                                                                              | -                                                                                 | -                                                                                 | -                                                                                 | -                                                                                 | -                                                                                 |
| Critical Hdwy            | 6.4                                                                               | 6.2                                                                               | 4.11                                                                              | -                                                                                 | -                                                                                 | -                                                                                 |
| Critical Hdwy Stg 1      | 5.4                                                                               | -                                                                                 | -                                                                                 | -                                                                                 | -                                                                                 | -                                                                                 |
| Critical Hdwy Stg 2      | 5.4                                                                               | -                                                                                 | -                                                                                 | -                                                                                 | -                                                                                 | -                                                                                 |
| Follow-up Hdwy           | 3.5                                                                               | 3.3                                                                               | 2.209                                                                             | -                                                                                 | -                                                                                 | -                                                                                 |
| Pot Cap-1 Maneuver       | 56                                                                                | 309                                                                               | 699                                                                               | -                                                                                 | -                                                                                 | -                                                                                 |
| Stage 1                  | 370                                                                               | -                                                                                 | -                                                                                 | -                                                                                 | -                                                                                 | -                                                                                 |
| Stage 2                  | 304                                                                               | -                                                                                 | -                                                                                 | -                                                                                 | -                                                                                 | -                                                                                 |
| Platoon blocked, %       | -                                                                                 | -                                                                                 | -                                                                                 | -                                                                                 | -                                                                                 | -                                                                                 |
| Mov Cap-1 Maneuver       | 52                                                                                | 307                                                                               | 699                                                                               | -                                                                                 | -                                                                                 | -                                                                                 |
| Mov Cap-2 Maneuver       | 52                                                                                | -                                                                                 | -                                                                                 | -                                                                                 | -                                                                                 | -                                                                                 |
| Stage 1                  | 368                                                                               | -                                                                                 | -                                                                                 | -                                                                                 | -                                                                                 | -                                                                                 |
| Stage 2                  | 284                                                                               | -                                                                                 | -                                                                                 | -                                                                                 | -                                                                                 | -                                                                                 |
| Approach                 |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
|                          | EB                                                                                | NB                                                                                |                                                                                   | SB                                                                                |                                                                                   |                                                                                   |
| HCM Control Delay, s     | 52.5                                                                              | 0.4                                                                               |                                                                                   | 0                                                                                 |                                                                                   |                                                                                   |
| HCM LOS                  | F                                                                                 |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| Minor Lane/Major Mvmt    |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
|                          | NBL                                                                               | NBT                                                                               | EBLn1                                                                             | SBT                                                                               | SBR                                                                               |                                                                                   |
| Capacity (veh/h)         | 699                                                                               | -                                                                                 | 233                                                                               | -                                                                                 | -                                                                                 |                                                                                   |
| HCM Lane V/C Ratio       | 0.062                                                                             | -                                                                                 | 0.723                                                                             | -                                                                                 | -                                                                                 |                                                                                   |
| HCM Control Delay (s)    | 10.5                                                                              | -                                                                                 | 52.5                                                                              | -                                                                                 | -                                                                                 |                                                                                   |
| HCM Lane LOS             | B                                                                                 | -                                                                                 | F                                                                                 | -                                                                                 | -                                                                                 |                                                                                   |
| HCM 95th %tile Q(veh)    | 0.2                                                                               | -                                                                                 | 4.9                                                                               | -                                                                                 | -                                                                                 |                                                                                   |

12239.00 :: Needham Street  
8: Needham Street & TJMaxx Driveway

2025 Build Conditions without Shuttle Service  
Timing Plan: Weekday Evening

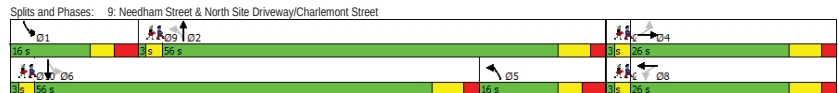
| Intersection             |        |                                                                                     |                                                                                     |        |                                                                                     |                                                                                     |
|--------------------------|--------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|--------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
| Int Delay, s/veh         | 0.1    |                                                                                     |                                                                                     |        |                                                                                     |                                                                                     |
| Movement                 | WBL    | WBR                                                                                 | NBT                                                                                 | NBR    | SBL                                                                                 | SBT                                                                                 |
| Lane Configurations      |        |  |  |        |  |  |
| Traffic Vol, veh/h       | 2      | 1                                                                                   | 905                                                                                 | 20     | 10                                                                                  | 875                                                                                 |
| Future Vol, veh/h        | 2      | 1                                                                                   | 905                                                                                 | 20     | 10                                                                                  | 875                                                                                 |
| Conflicting Peds, #/hr   | 0      | 0                                                                                   | 0                                                                                   | 4      | 4                                                                                   | 0                                                                                   |
| Sign Control             | Stop   | Stop                                                                                | Free                                                                                | Free   | Free                                                                                | Free                                                                                |
| RT Channelized           | -      | None                                                                                | -                                                                                   | None   | -                                                                                   | None                                                                                |
| Storage Length           | -      | 0                                                                                   | -                                                                                   | -      | 80                                                                                  | -                                                                                   |
| Veh in Median Storage, # | 0      | -                                                                                   | 0                                                                                   | -      | -                                                                                   | 0                                                                                   |
| Grade, %                 | 0      | -                                                                                   | 0                                                                                   | -      | -                                                                                   | 0                                                                                   |
| Peak Hour Factor         | 92     | 92                                                                                  | 92                                                                                  | 92     | 92                                                                                  | 92                                                                                  |
| Heavy Vehicles, %        | 0      | 0                                                                                   | 1                                                                                   | 1      | 1                                                                                   | 1                                                                                   |
| Mvmt Flow                | 2      | 1                                                                                   | 984                                                                                 | 22     | 11                                                                                  | 951                                                                                 |
| Major/Minor              |        |                                                                                     |                                                                                     |        |                                                                                     |                                                                                     |
|                          | Minor1 | Major1                                                                              |                                                                                     | Major2 |                                                                                     |                                                                                     |
| Conflicting Flow All     | 1972   | 999                                                                                 | 0                                                                                   | 0      | 1009                                                                                | 0                                                                                   |
| Stage 1                  | 999    | -                                                                                   | -                                                                                   | -      | -                                                                                   | -                                                                                   |
| Stage 2                  | 973    | -                                                                                   | -                                                                                   | -      | -                                                                                   | -                                                                                   |
| Critical Hdwy            | 6.4    | 6.2                                                                                 | -                                                                                   | -      | 4.11                                                                                | -                                                                                   |
| Critical Hdwy Stg 1      | 5.4    | -                                                                                   | -                                                                                   | -      | -                                                                                   | -                                                                                   |
| Critical Hdwy Stg 2      | 5.4    | -                                                                                   | -                                                                                   | -      | -                                                                                   | -                                                                                   |
| Follow-up Hdwy           | 3.5    | 3.3                                                                                 | -                                                                                   | -      | 2.209                                                                               | -                                                                                   |
| Pot Cap-1 Maneuver       | 69     | 298                                                                                 | -                                                                                   | -      | 691                                                                                 | -                                                                                   |
| Stage 1                  | 359    | -                                                                                   | -                                                                                   | -      | -                                                                                   | -                                                                                   |
| Stage 2                  | 370    | -                                                                                   | -                                                                                   | -      | -                                                                                   | -                                                                                   |
| Platoon blocked, %       | -      | -                                                                                   | -                                                                                   | -      | -                                                                                   | -                                                                                   |
| Mov Cap-1 Maneuver       | 68     | 297                                                                                 | -                                                                                   | -      | 691                                                                                 | -                                                                                   |
| Mov Cap-2 Maneuver       | 68     | -                                                                                   | -                                                                                   | -      | -                                                                                   | -                                                                                   |
| Stage 1                  | 358    | -                                                                                   | -                                                                                   | -      | -                                                                                   | -                                                                                   |
| Stage 2                  | 364    | -                                                                                   | -                                                                                   | -      | -                                                                                   | -                                                                                   |
| Approach                 |        |                                                                                     |                                                                                     |        |                                                                                     |                                                                                     |
|                          | WB     | NB                                                                                  |                                                                                     | SB     |                                                                                     |                                                                                     |
| HCM Control Delay, s     | 17.2   | 0                                                                                   |                                                                                     | 0.1    |                                                                                     |                                                                                     |
| HCM LOS                  | C      |                                                                                     |                                                                                     |        |                                                                                     |                                                                                     |
| Minor Lane/Major Mvmt    |        |                                                                                     |                                                                                     |        |                                                                                     |                                                                                     |
|                          | NBT    | NBR                                                                                 | WBLn1                                                                               | SBL    | SBT                                                                                 |                                                                                     |
| Capacity (veh/h)         | -      | -                                                                                   | 297                                                                                 | 691    | -                                                                                   |                                                                                     |
| HCM Lane V/C Ratio       | -      | -                                                                                   | 0.004                                                                               | 0.016  | -                                                                                   |                                                                                     |
| HCM Control Delay (s)    | -      | -                                                                                   | 17.2                                                                                | 10.3   | -                                                                                   |                                                                                     |
| HCM Lane LOS             | -      | -                                                                                   | C                                                                                   | B      | -                                                                                   |                                                                                     |
| HCM 95th %ile Q(veh)     | -      | -                                                                                   | 0                                                                                   | 0      | -                                                                                   |                                                                                     |

12239.00 :: Needham Street  
9: Needham Street & North Site Driveway/Charlemont Street

2025 Build Conditions without Shuttle Service  
Timing Plan: Weekday Evening

| Lane Group              | EBL                                                                               | EBT                                                                               | EBR                                                                               | WBL                                                                               | WBT                                                                               | WBR                                                                               | NBL                                                                               | NBT                                                                               | NBR                                                                               | SBL                                                                               | SBT                                                                               | SBR                                                                               | Ø3   | Ø7   | Ø9   | Ø10  |
|-------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|------|------|------|------|
| Lane Configurations     |  |  |  |  |  |  |  |  |  |  |  |  |      |      |      |      |
| Traffic Volume (vph)    | 185                                                                               | 0                                                                                 | 95                                                                                | 35                                                                                | 15                                                                                | 25                                                                                | 120                                                                               | 760                                                                               | 25                                                                                | 5                                                                                 | 755                                                                               | 115                                                                               |      |      |      |      |
| Future Volume (vph)     | 185                                                                               | 0                                                                                 | 95                                                                                | 35                                                                                | 15                                                                                | 25                                                                                | 120                                                                               | 760                                                                               | 25                                                                                | 5                                                                                 | 755                                                                               | 115                                                                               |      |      |      |      |
| Ideal Flow (vphpl)      | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                              |      |      |      |      |
| Storage Length (ft)     | 125                                                                               | 0                                                                                 | 0                                                                                 | 125                                                                               | 0                                                                                 | 0                                                                                 | 100                                                                               | 0                                                                                 | 100                                                                               | 0                                                                                 | 100                                                                               | 0                                                                                 |      |      |      |      |
| Storage Lanes           | 1                                                                                 | 0                                                                                 | 0                                                                                 | 1                                                                                 | 0                                                                                 | 0                                                                                 | 1                                                                                 | 0                                                                                 | 1                                                                                 | 0                                                                                 | 1                                                                                 | 0                                                                                 |      |      |      |      |
| Taper Length (ft)       | 25                                                                                | 0                                                                                 | 0                                                                                 | 25                                                                                | 0                                                                                 | 0                                                                                 | 25                                                                                | 0                                                                                 | 25                                                                                | 0                                                                                 | 25                                                                                | 0                                                                                 |      |      |      |      |
| Satd. Flow (prot)       | 1805                                                                              | 1615                                                                              | 0                                                                                 | 1805                                                                              | 1721                                                                              | 0                                                                                 | 1787                                                                              | 1870                                                                              | 0                                                                                 | 1787                                                                              | 1833                                                                              | 0                                                                                 |      |      |      |      |
| Fit Permitted           | 0.729                                                                             |                                                                                   |                                                                                   | 0.690                                                                             |                                                                                   |                                                                                   | 0.081                                                                             |                                                                                   |                                                                                   | 0.122                                                                             |                                                                                   |                                                                                   |      |      |      |      |
| Satd. Flow (perm)       | 1385                                                                              | 1615                                                                              | 0                                                                                 | 1311                                                                              | 1721                                                                              | 0                                                                                 | 152                                                                               | 1870                                                                              | 0                                                                                 | 230                                                                               | 1833                                                                              | 0                                                                                 |      |      |      |      |
| Right Turn on Red       |                                                                                   |                                                                                   | Yes                                                                               |                                                                                   | Yes                                                                               |                                                                                   |                                                                                   | Yes                                                                               |                                                                                   |                                                                                   | Yes                                                                               |                                                                                   |      |      |      |      |
| Satd. Flow (RTOR)       |                                                                                   | 327                                                                               |                                                                                   |                                                                                   | 27                                                                                |                                                                                   |                                                                                   | 2                                                                                 |                                                                                   |                                                                                   | 10                                                                                |                                                                                   |      |      |      |      |
| Link Speed (mph)        |                                                                                   | 30                                                                                |                                                                                   |                                                                                   | 30                                                                                |                                                                                   |                                                                                   | 30                                                                                |                                                                                   |                                                                                   | 30                                                                                |                                                                                   |      |      |      |      |
| Link Distance (ft)      |                                                                                   | 491                                                                               |                                                                                   |                                                                                   | 696                                                                               |                                                                                   |                                                                                   | 244                                                                               |                                                                                   |                                                                                   | 497                                                                               |                                                                                   |      |      |      |      |
| Travel Time (s)         |                                                                                   | 11.2                                                                              |                                                                                   |                                                                                   | 15.8                                                                              |                                                                                   |                                                                                   | 5.5                                                                               |                                                                                   |                                                                                   | 11.3                                                                              |                                                                                   |      |      |      |      |
| Confl. Peds. (#/hr)     |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   | 7                                                                                 |                                                                                   | 3                                                                                 | 3                                                                                 |                                                                                   | 7                                                                                 |      |      |      |      |
| Confl. Bikes (#/hr)     |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   | 2                                                                                 |                                                                                   |                                                                                   |                                                                                   |                                                                                   |      |      |      |      |
| Peak Hour Factor        | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              |      |      |      |      |
| Heavy Vehicles (%)      | 0%                                                                                | 0%                                                                                | 0%                                                                                | 0%                                                                                | 0%                                                                                | 0%                                                                                | 1%                                                                                | 1%                                                                                | 1%                                                                                | 1%                                                                                | 1%                                                                                | 1%                                                                                |      |      |      |      |
| Shared Lane Traffic (%) |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |      |      |      |      |
| Lane Group Flow (vph)   | 201                                                                               | 103                                                                               | 0                                                                                 | 38                                                                                | 43                                                                                | 0                                                                                 | 130                                                                               | 853                                                                               | 0                                                                                 | 5                                                                                 | 946                                                                               | 0                                                                                 |      |      |      |      |
| Turn Type               | Perm                                                                              | NA                                                                                |                                                                                   | Perm                                                                              | NA                                                                                |                                                                                   | pm+pt                                                                             | NA                                                                                |                                                                                   | pm+pt                                                                             | NA                                                                                |                                                                                   |      |      |      |      |
| Protected Phases        | 4                                                                                 |                                                                                   |                                                                                   | 8                                                                                 |                                                                                   |                                                                                   | 5                                                                                 | 2                                                                                 |                                                                                   | 1                                                                                 | 6                                                                                 |                                                                                   | 3    | 7    | 9    | 10   |
| Permitted Phases        | 4                                                                                 |                                                                                   |                                                                                   | 8                                                                                 |                                                                                   |                                                                                   | 2                                                                                 |                                                                                   |                                                                                   | 6                                                                                 |                                                                                   |                                                                                   |      |      |      |      |
| Detector Phase          | 4                                                                                 | 4                                                                                 |                                                                                   | 8                                                                                 | 8                                                                                 |                                                                                   | 5                                                                                 | 2                                                                                 |                                                                                   | 1                                                                                 | 6                                                                                 |                                                                                   |      |      |      |      |
| Switch Phase            |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |      |      |      |      |
| Minimum Initial (s)     | 3.0                                                                               | 3.0                                                                               |                                                                                   | 3.0                                                                               | 3.0                                                                               |                                                                                   | 3.0                                                                               | 3.0                                                                               |                                                                                   | 3.0                                                                               | 3.0                                                                               |                                                                                   | 1.0  | 1.0  | 1.0  | 1.0  |
| Minimum Split (s)       | 23.0                                                                              | 23.0                                                                              |                                                                                   | 23.0                                                                              | 23.0                                                                              |                                                                                   | 9.0                                                                               | 22.0                                                                              |                                                                                   | 9.0                                                                               | 22.0                                                                              |                                                                                   | 3.0  | 3.0  | 3.0  | 3.0  |
| Total Split (s)         | 26.0                                                                              | 26.0                                                                              |                                                                                   | 26.0                                                                              | 26.0                                                                              |                                                                                   | 16.0                                                                              | 56.0                                                                              |                                                                                   | 16.0                                                                              | 56.0                                                                              |                                                                                   | 3.0  | 3.0  | 3.0  | 3.0  |
| Total Split (%)         | 25.0%                                                                             | 25.0%                                                                             |                                                                                   | 25.0%                                                                             | 25.0%                                                                             |                                                                                   | 15.4%                                                                             | 53.6%                                                                             |                                                                                   | 15.4%                                                                             | 53.6%                                                                             |                                                                                   | 3%   | 3%   | 3%   | 3%   |
| Yellow Time (s)         | 4.0                                                                               | 4.0                                                                               |                                                                                   | 4.0                                                                               | 4.0                                                                               |                                                                                   | 3.0                                                                               | 4.0                                                                               |                                                                                   | 3.0                                                                               | 4.0                                                                               |                                                                                   | 2.0  | 2.0  | 2.0  | 2.0  |
| All-Red Time (s)        | 2.0                                                                               | 2.0                                                                               |                                                                                   | 2.0                                                                               | 2.0                                                                               |                                                                                   | 3.0                                                                               | 2.0                                                                               |                                                                                   | 3.0                                                                               | 2.0                                                                               |                                                                                   | 0.0  | 0.0  | 0.0  | 0.0  |
| Lost Time Adjust (s)    | 0.0                                                                               | 0.0                                                                               |                                                                                   | 0.0                                                                               | 0.0                                                                               |                                                                                   | 0.0                                                                               | 0.0                                                                               |                                                                                   | 0.0                                                                               | 0.0                                                                               |                                                                                   |      |      |      |      |
| Total Lost Time (s)     | 6.0                                                                               | 6.0                                                                               |                                                                                   | 6.0                                                                               | 6.0                                                                               |                                                                                   | 6.0                                                                               | 6.0                                                                               |                                                                                   | 6.0                                                                               | 6.0                                                                               |                                                                                   |      |      |      |      |
| Lead/Lag                | Lag                                                                               | Lag                                                                               |                                                                                   | Lag                                                                               | Lag                                                                               |                                                                                   |                                                                                   |                                                                                   | Lead                                                                              | Lag                                                                               |                                                                                   |                                                                                   | Lead | Lead | Lag  | Lead |
| Lead-Lag Optimize?      |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |      |      |      |      |
| Recall Mode             | None                                                                              | None                                                                              |                                                                                   | None                                                                              | None                                                                              |                                                                                   | None                                                                              | Min                                                                               |                                                                                   | None                                                                              | Min                                                                               |                                                                                   | None | None | None | None |
| Act Effect Green (s)    | 16.7                                                                              | 16.7                                                                              |                                                                                   | 16.7                                                                              | 16.7                                                                              |                                                                                   | 61.5                                                                              | 61.5                                                                              |                                                                                   | 50.9                                                                              | 50.4                                                                              |                                                                                   |      |      |      |      |
| Actuated g/C Ratio      | 0.18                                                                              | 0.18                                                                              |                                                                                   | 0.18                                                                              | 0.18                                                                              |                                                                                   | 0.66                                                                              | 0.66                                                                              |                                                                                   | 0.55                                                                              | 0.54                                                                              |                                                                                   |      |      |      |      |
| v/c Ratio               | 0.81                                                                              | 0.18                                                                              |                                                                                   | 0.16                                                                              | 0.13                                                                              |                                                                                   | 0.58                                                                              | 0.69                                                                              |                                                                                   | 0.02                                                                              | 0.95                                                                              |                                                                                   |      |      |      |      |
| Control Delay           | 61.3                                                                              | 0.7                                                                               |                                                                                   | 34.2                                                                              | 18.2                                                                              |                                                                                   | 35.4                                                                              | 15.6                                                                              |                                                                                   | 11.4                                                                              | 40.8                                                                              |                                                                                   |      |      |      |      |
| Queue Delay             | 0.0                                                                               | 0.0                                                                               |                                                                                   | 0.0                                                                               | 0.0                                                                               |                                                                                   | 0.0                                                                               | 0.0                                                                               |                                                                                   | 0.0                                                                               | 0.0                                                                               |                                                                                   |      |      |      |      |
| Total Delay             | 61.3                                                                              | 0.7                                                                               |                                                                                   | 34.2                                                                              | 18.2                                                                              |                                                                                   | 35.4                                                                              | 15.6                                                                              |                                                                                   | 11.4                                                                              | 40.8                                                                              |                                                                                   |      |      |      |      |
| LOS                     | E                                                                                 | A                                                                                 |                                                                                   | C                                                                                 | B                                                                                 |                                                                                   | D                                                                                 | B                                                                                 |                                                                                   | B                                                                                 | D                                                                                 |                                                                                   |      |      |      |      |
| Approach Delay          |                                                                                   | 40.8                                                                              |                                                                                   |                                                                                   | 25.7                                                                              |                                                                                   |                                                                                   | 18.2                                                                              |                                                                                   |                                                                                   | 40.7                                                                              |                                                                                   |      |      |      |      |
| Approach LOS            |                                                                                   | D                                                                                 |                                                                                   |                                                                                   | C                                                                                 |                                                                                   |                                                                                   | B                                                                                 |                                                                                   |                                                                                   | D                                                                                 |                                                                                   |      |      |      |      |
| Queue Length 50th (ft)  | 112                                                                               | 0                                                                                 |                                                                                   | 19                                                                                | 8                                                                                 |                                                                                   | 24                                                                                | 268                                                                               |                                                                                   | 1                                                                                 | 501                                                                               |                                                                                   |      |      |      |      |
| Queue Length 95th (ft)  | #228                                                                              | 0                                                                                 |                                                                                   | 50                                                                                | 37                                                                                |                                                                                   | 92                                                                                | #641                                                                              |                                                                                   | 7                                                                                 | #901                                                                              |                                                                                   |      |      |      |      |
| Internal Link Dist (ft) |                                                                                   | 411                                                                               |                                                                                   |                                                                                   | 616                                                                               |                                                                                   |                                                                                   | 164                                                                               |                                                                                   |                                                                                   | 417                                                                               |                                                                                   |      |      |      |      |
| Turn Bay Length (ft)    | 125                                                                               |                                                                                   |                                                                                   | 125                                                                               |                                                                                   |                                                                                   | 100                                                                               |                                                                                   |                                                                                   | 100                                                                               |                                                                                   |                                                                                   |      |      |      |      |
| Base Capacity (vph)     | 299                                                                               | 605                                                                               |                                                                                   | 283                                                                               | 393                                                                               |                                                                                   | 282                                                                               | 1239                                                                              |                                                                                   | 294                                                                               | 999                                                                               |                                                                                   |      |      |      |      |
| Starvation Cap Reductn  | 0                                                                                 | 0                                                                                 |                                                                                   | 0                                                                                 | 0                                                                                 |                                                                                   | 0                                                                                 | 0                                                                                 |                                                                                   | 0                                                                                 | 0                                                                                 |                                                                                   |      |      |      |      |
| Spillback Cap Reductn   | 0                                                                                 | 0                                                                                 |                                                                                   | 0                                                                                 | 0                                                                                 |                                                                                   | 0                                                                                 | 0                                                                                 |                                                                                   | 0                                                                                 | 0                                                                                 |                                                                                   |      |      |      |      |
| Storage Cap Reductn     | 0                                                                                 | 0                                                                                 |                                                                                   | 0                                                                                 | 0                                                                                 |                                                                                   | 0                                                                                 | 0                                                                                 |                                                                                   | 0                                                                                 | 0                                                                                 |                                                                                   |      |      |      |      |
| Reduced v/c Ratio       | 0.67                                                                              | 0.17                                                                              |                                                                                   | 0.13                                                                              | 0.11                                                                              |                                                                                   | 0.46                                                                              | 0.69                                                                              |                                                                                   | 0.02                                                                              | 0.95                                                                              |                                                                                   |      |      |      |      |

| Intersection Summary                                            |                        |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|-----------------------------------------------------------------|------------------------|--|--|--|--|--|--|--|--|--|--|--|--|--|--|
| Area Type:                                                      | Other                  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Cycle Length:                                                   | 104                    |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Actuated Cycle Length:                                          | 92.8                   |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Natural Cycle:                                                  | 90                     |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Control Type:                                                   | Actuated-Uncoordinated |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Maximum v/c Ratio:                                              | 0.95                   |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Intersection Signal Delay:                                      | 30.6                   |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Intersection Capacity Utilization:                              | 85.4%                  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| ICU Level of Service:                                           | E                      |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Analysis Period (min):                                          | 15                     |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| # 95th percentile volume exceeds capacity, queue may be longer. |                        |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Queue shown is maximum after two cycles.                        |                        |  |  |  |  |  |  |  |  |  |  |  |  |  |  |



12239.00 :: Needham Street  
10: Needham Street & Tower Road/Industrial Place

2025 Build Conditions without Shuttle Service  
Timing Plan: Weekday Evening

| Intersection                                                                                                         |         |                                                                                     |           |         |                                                                                     |        |      |                                                                                     |        |                                                                                     |                                                                                     |      |
|----------------------------------------------------------------------------------------------------------------------|---------|-------------------------------------------------------------------------------------|-----------|---------|-------------------------------------------------------------------------------------|--------|------|-------------------------------------------------------------------------------------|--------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|------|
| Int Delay, s/veh                                                                                                     | 260     |                                                                                     |           |         |                                                                                     |        |      |                                                                                     |        |                                                                                     |                                                                                     |      |
| Movement                                                                                                             | EBL     | EBT                                                                                 | EBR       | WBL     | WBT                                                                                 | WBR    | NBL  | NBT                                                                                 | NBR    | SBL                                                                                 | SBT                                                                                 | SBR  |
| Lane Configurations                                                                                                  |         |  |           |         |  |        |      |  |        |  |  |      |
| Traffic Vol, veh/h                                                                                                   | 110     | 5                                                                                   | 75        | 65      | 5                                                                                   | 45     | 65   | 905                                                                                 | 40     | 20                                                                                  | 735                                                                                 | 90   |
| Future Vol, veh/h                                                                                                    | 110     | 5                                                                                   | 75        | 65      | 5                                                                                   | 45     | 65   | 905                                                                                 | 40     | 20                                                                                  | 735                                                                                 | 90   |
| Conflicting Peds, #/hr                                                                                               | 0       | 0                                                                                   | 8         | 8       | 0                                                                                   | 0      | 9    | 0                                                                                   | 2      | 2                                                                                   | 0                                                                                   | 9    |
| Sign Control                                                                                                         | Stop    | Stop                                                                                | Stop      | Stop    | Stop                                                                                | Stop   | Free | Free                                                                                | Free   | Free                                                                                | Free                                                                                | Free |
| RT Channelized                                                                                                       | -       | -                                                                                   | None      | -       | -                                                                                   | None   | -    | -                                                                                   | None   | -                                                                                   | -                                                                                   | None |
| Storage Length                                                                                                       | -       | -                                                                                   | -         | -       | -                                                                                   | -      | -    | -                                                                                   | -      | 100                                                                                 | -                                                                                   | -    |
| Veh in Median Storage, #                                                                                             | -       | 0                                                                                   | -         | -       | 0                                                                                   | -      | -    | 0                                                                                   | -      | -                                                                                   | 0                                                                                   | -    |
| Grade, %                                                                                                             | -       | 0                                                                                   | -         | -       | 0                                                                                   | -      | -    | 0                                                                                   | -      | -                                                                                   | 0                                                                                   | -    |
| Peak Hour Factor                                                                                                     | 92      | 92                                                                                  | 92        | 92      | 92                                                                                  | 92     | 92   | 92                                                                                  | 92     | 92                                                                                  | 92                                                                                  | 92   |
| Heavy Vehicles, %                                                                                                    | 1       | 1                                                                                   | 1         | 1       | 1                                                                                   | 1      | 0    | 0                                                                                   | 0      | 1                                                                                   | 1                                                                                   | 1    |
| Mvmt Flow                                                                                                            | 120     | 5                                                                                   | 82        | 71      | 5                                                                                   | 49     | 71   | 984                                                                                 | 43     | 22                                                                                  | 799                                                                                 | 98   |
| Major/Minor                                                                                                          |         |                                                                                     |           |         |                                                                                     |        |      |                                                                                     |        |                                                                                     |                                                                                     |      |
|                                                                                                                      | Minor2  |                                                                                     | Minor1    |         |                                                                                     | Major1 |      |                                                                                     | Major2 |                                                                                     |                                                                                     |      |
| Conflicting Flow All                                                                                                 | 2074    | 2070                                                                                | 865       | 2092    | 2098                                                                                | 1007   | 906  | 0                                                                                   | 0      | 1029                                                                                | 0                                                                                   | 0    |
| Stage 1                                                                                                              | 900     | 900                                                                                 | -         | 1149    | 1149                                                                                | -      | -    | -                                                                                   | -      | -                                                                                   | -                                                                                   | -    |
| Stage 2                                                                                                              | 1174    | 1170                                                                                | -         | 943     | 949                                                                                 | -      | -    | -                                                                                   | -      | -                                                                                   | -                                                                                   | -    |
| Critical Hdwy                                                                                                        | 7.11    | 6.51                                                                                | 6.21      | 7.11    | 6.51                                                                                | 6.21   | 4.1  | -                                                                                   | -      | 4.11                                                                                | -                                                                                   | -    |
| Critical Hdwy Stg 1                                                                                                  | 6.11    | 5.51                                                                                | -         | 6.11    | 5.51                                                                                | -      | -    | -                                                                                   | -      | -                                                                                   | -                                                                                   | -    |
| Critical Hdwy Stg 2                                                                                                  | 6.11    | 5.51                                                                                | -         | 6.11    | 5.51                                                                                | -      | -    | -                                                                                   | -      | -                                                                                   | -                                                                                   | -    |
| Follow-up Hdwy                                                                                                       | 3.509   | 4.009                                                                               | 3.309     | 3.509   | 4.009                                                                               | 3.309  | 2.2  | -                                                                                   | -      | 2.209                                                                               | -                                                                                   | -    |
| Pot Cap-1 Maneuver                                                                                                   | ~40     | 54                                                                                  | 355       | ~39     | 52                                                                                  | 294    | 759  | -                                                                                   | -      | 679                                                                                 | -                                                                                   | -    |
| Stage 1                                                                                                              | 334     | 359                                                                                 | -         | 243     | 274                                                                                 | -      | -    | -                                                                                   | -      | -                                                                                   | -                                                                                   | -    |
| Stage 2                                                                                                              | 235     | 268                                                                                 | -         | 317     | 340                                                                                 | -      | -    | -                                                                                   | -      | -                                                                                   | -                                                                                   | -    |
| Platoon blocked, %                                                                                                   |         |                                                                                     |           |         |                                                                                     |        |      |                                                                                     |        |                                                                                     |                                                                                     |      |
| Mov Cap-1 Maneuver                                                                                                   | ~24     | 40                                                                                  | 350       | ~22     | 39                                                                                  | 294    | 754  | -                                                                                   | -      | 679                                                                                 | -                                                                                   | -    |
| Mov Cap-2 Maneuver                                                                                                   | ~24     | 40                                                                                  | -         | ~22     | 39                                                                                  | -      | -    | -                                                                                   | -      | -                                                                                   | -                                                                                   | -    |
| Stage 1                                                                                                              | 258     | 345                                                                                 | -         | 189     | 213                                                                                 | -      | -    | -                                                                                   | -      | -                                                                                   | -                                                                                   | -    |
| Stage 2                                                                                                              | 149     | 208                                                                                 | -         | 230     | 327                                                                                 | -      | -    | -                                                                                   | -      | -                                                                                   | -                                                                                   | -    |
| Approach                                                                                                             |         |                                                                                     |           |         |                                                                                     |        |      |                                                                                     |        |                                                                                     |                                                                                     |      |
|                                                                                                                      | EB      |                                                                                     | WB        |         |                                                                                     | NB     |      |                                                                                     | SB     |                                                                                     |                                                                                     |      |
| HCM Control Delay, s                                                                                                 | \$ 2138 |                                                                                     | \$ 1343.6 |         |                                                                                     | 0.7    |      |                                                                                     | 0.2    |                                                                                     |                                                                                     |      |
| HCM LOS                                                                                                              | F       |                                                                                     | F         |         |                                                                                     |        |      |                                                                                     |        |                                                                                     |                                                                                     |      |
| Minor Lane/Major Mvmt                                                                                                |         |                                                                                     |           |         |                                                                                     |        |      |                                                                                     |        |                                                                                     |                                                                                     |      |
|                                                                                                                      | NBL     | NBT                                                                                 | NBR       | EBLn1   | WBLn1                                                                               | SBL    | SBT  | SBR                                                                                 |        |                                                                                     |                                                                                     |      |
| Capacity (veh/h)                                                                                                     | 754     | -                                                                                   | -         | 39      | 36                                                                                  | 679    | -    | -                                                                                   |        |                                                                                     |                                                                                     |      |
| HCM Lane V/C Ratio                                                                                                   | 0.094   | -                                                                                   | -         | 5.295   | 3.472                                                                               | 0.032  | -    | -                                                                                   |        |                                                                                     |                                                                                     |      |
| HCM Control Delay (s)                                                                                                | 10.3    | 0                                                                                   | -         | \$ 2138 | \$ 1343.6                                                                           | 10.5   | -    | -                                                                                   |        |                                                                                     |                                                                                     |      |
| HCM Lane LOS                                                                                                         | B       | A                                                                                   | -         | F       | F                                                                                   | B      | -    | -                                                                                   |        |                                                                                     |                                                                                     |      |
| HCM 95th %ile Q(veh)                                                                                                 | 0.3     | -                                                                                   | -         | 24.1    | 14.4                                                                                | 0.1    | -    | -                                                                                   |        |                                                                                     |                                                                                     |      |
| Notes                                                                                                                |         |                                                                                     |           |         |                                                                                     |        |      |                                                                                     |        |                                                                                     |                                                                                     |      |
| ~: Volume exceeds capacity    \$: Delay exceeds 300s    +: Computation Not Defined    *: All major volume in platoon |         |                                                                                     |           |         |                                                                                     |        |      |                                                                                     |        |                                                                                     |                                                                                     |      |

12239.00 :: Needham Street  
11: Needham Street & Jaconnet Street

2025 Build Conditions without Shuttle Service  
Timing Plan: Weekday Evening

| Intersection             |        |        |       |        |       |      |
|--------------------------|--------|--------|-------|--------|-------|------|
| Int Delay, s/veh         | 9.9    |        |       |        |       |      |
| Movement                 | WBL    | WBR    | NBT   | NBR    | SBL   | SBT  |
| Lane Configurations      | ↵      |        | ↵     |        | ↵     | ↵    |
| Traffic Vol, veh/h       | 55     | 30     | 965   | 30     | 10    | 835  |
| Future Vol, veh/h        | 55     | 30     | 965   | 30     | 10    | 835  |
| Conflicting Peds, #/hr   | 0      | 1      | 0     | 33     | 33    | 0    |
| Sign Control             | Stop   | Stop   | Free  | Free   | Free  | Free |
| RT Channelized           | -      | None   | -     | None   | -     | None |
| Storage Length           | 0      | -      | -     | -      | 100   | -    |
| Veh in Median Storage, # | 0      | -      | 0     | -      | -     | 0    |
| Grade, %                 | 0      | -      | 0     | -      | -     | 0    |
| Peak Hour Factor         | 92     | 92     | 92    | 92     | 92    | 92   |
| Heavy Vehicles, %        | 0      | 0      | 1     | 1      | 1     | 1    |
| Mvmt Flow                | 60     | 33     | 1049  | 33     | 11    | 908  |
| Major/Minor              |        |        |       |        |       |      |
|                          | Minor1 | Major1 |       | Major2 |       |      |
| Conflicting Flow All     | 2027   | 1099   | 0     | 0      | 1115  | 0    |
| Stage 1                  | 1098   | -      | -     | -      | -     | -    |
| Stage 2                  | 929    | -      | -     | -      | -     | -    |
| Critical Hdwy            | 6.4    | 6.2    | -     | -      | 4.11  | -    |
| Critical Hdwy Stg 1      | 5.4    | -      | -     | -      | -     | -    |
| Critical Hdwy Stg 2      | 5.4    | -      | -     | -      | -     | -    |
| Follow-up Hdwy           | 3.5    | 3.3    | -     | -      | 2.209 | -    |
| Pot Cap-1 Maneuver       | 64     | 261    | -     | -      | 630   | -    |
| Stage 1                  | 322    | -      | -     | -      | -     | -    |
| Stage 2                  | 388    | -      | -     | -      | -     | -    |
| Platoon blocked, %       |        |        | -     | -      | -     | -    |
| Mov Cap-1 Maneuver       | 61     | 254    | -     | -      | 629   | -    |
| Mov Cap-2 Maneuver       | 61     | -      | -     | -      | -     | -    |
| Stage 1                  | 313    | -      | -     | -      | -     | -    |
| Stage 2                  | 381    | -      | -     | -      | -     | -    |
| Approach                 |        |        |       |        |       |      |
|                          | WB     | NB     |       | SB     |       |      |
| HCM Control Delay, s     | 223.4  | 0      |       | 0.1    |       |      |
| HCM LOS                  | F      |        |       |        |       |      |
| Minor Lane/Major Mvmt    |        |        |       |        |       |      |
|                          | NBT    | NBR    | WBLn1 | SBL    | SBT   |      |
| Capacity (veh/h)         | -      | -      | 83    | 629    | -     |      |
| HCM Lane V/C Ratio       | -      | -      | 1.113 | 0.017  | -     |      |
| HCM Control Delay (s)    | -      | -      | 223.4 | 10.8   | -     |      |
| HCM Lane LOS             | -      | -      | F     | B      | -     |      |
| HCM 95th %tile Q(veh)    | -      | -      | 6.5   | 0.1    | -     |      |

12239.00 :: Needham Street  
12: Needham Street & Rockland Street

2025 Build Conditions without Shuttle Service  
Timing Plan: Weekday Evening

| Intersection             |        |        |       |        |       |      |
|--------------------------|--------|--------|-------|--------|-------|------|
| Int Delay, s/veh         | 0.4    |        |       |        |       |      |
| Movement                 | WBL    | WBR    | NBT   | NBR    | SBL   | SBT  |
| Lane Configurations      | ↵      |        | ↵     |        | ↵     | ↵    |
| Traffic Vol, veh/h       | 5      | 10     | 1010  | 15     | 15    | 855  |
| Future Vol, veh/h        | 5      | 10     | 1010  | 15     | 15    | 855  |
| Conflicting Peds, #/hr   | 1      | 0      | 0     | 7      | 7     | 0    |
| Sign Control             | Stop   | Stop   | Free  | Free   | Free  | Free |
| RT Channelized           | -      | None   | -     | None   | -     | None |
| Storage Length           | 0      | -      | -     | -      | 125   | -    |
| Veh in Median Storage, # | 0      | -      | 0     | -      | -     | 0    |
| Grade, %                 | 0      | -      | 0     | -      | -     | 0    |
| Peak Hour Factor         | 92     | 92     | 92    | 92     | 92    | 92   |
| Heavy Vehicles, %        | 0      | 0      | 1     | 1      | 1     | 1    |
| Mvmt Flow                | 5      | 11     | 1098  | 16     | 16    | 929  |
| Major/Minor              |        |        |       |        |       |      |
|                          | Minor1 | Major1 |       | Major2 |       |      |
| Conflicting Flow All     | 2076   | 1113   | 0     | 0      | 1121  | 0    |
| Stage 1                  | 1113   | -      | -     | -      | -     | -    |
| Stage 2                  | 963    | -      | -     | -      | -     | -    |
| Critical Hdwy            | 6.4    | 6.2    | -     | -      | 4.11  | -    |
| Critical Hdwy Stg 1      | 5.4    | -      | -     | -      | -     | -    |
| Critical Hdwy Stg 2      | 5.4    | -      | -     | -      | -     | -    |
| Follow-up Hdwy           | 3.5    | 3.3    | -     | -      | 2.209 | -    |
| Pot Cap-1 Maneuver       | 60     | 256    | -     | -      | 627   | -    |
| Stage 1                  | 317    | -      | -     | -      | -     | -    |
| Stage 2                  | 374    | -      | -     | -      | -     | -    |
| Platoon blocked, %       |        |        | -     | -      | -     | -    |
| Mov Cap-1 Maneuver       | 58     | 255    | -     | -      | 627   | -    |
| Mov Cap-2 Maneuver       | 58     | -      | -     | -      | -     | -    |
| Stage 1                  | 315    | -      | -     | -      | -     | -    |
| Stage 2                  | 364    | -      | -     | -      | -     | -    |
| Approach                 |        |        |       |        |       |      |
|                          | WB     | NB     |       | SB     |       |      |
| HCM Control Delay, s     | 39.7   | 0      |       | 0.2    |       |      |
| HCM LOS                  | E      |        |       |        |       |      |
| Minor Lane/Major Mvmt    |        |        |       |        |       |      |
|                          | NBT    | NBR    | WBLn1 | SBL    | SBT   |      |
| Capacity (veh/h)         | -      | -      | 120   | 627    | -     |      |
| HCM Lane V/C Ratio       | -      | -      | 0.136 | 0.026  | -     |      |
| HCM Control Delay (s)    | -      | -      | 39.7  | 10.9   | -     |      |
| HCM Lane LOS             | -      | -      | E     | B      | -     |      |
| HCM 95th %ile Q(veh)     | -      | -      | 0.5   | 0.1    | -     |      |

2025 Build Conditions without Shuttle Service  
Timing Plan: Weekday Evening

| Intersection Summary              |                                                               |                        |
|-----------------------------------|---------------------------------------------------------------|------------------------|
| Area Type:                        | Other                                                         |                        |
| Cycle Length:                     | 95                                                            |                        |
| Actuated Cycle Length:            | 51.3                                                          |                        |
| Natural Cycle:                    | 90                                                            |                        |
| Control Type:                     | Actuated-Uncoordinated                                        |                        |
| Maximum v/c Ratio:                | 0.69                                                          |                        |
| Intersection Signal Delay:        | 8.1                                                           | Intersection LOS: A    |
| Intersection Capacity Utilization | 71.1%                                                         | ICU Level of Service C |
| Analysis Period (min)             | 15                                                            |                        |
| #                                 | 95th percentile volume exceeds capacity, queue may be longer. |                        |
|                                   | Queue shown is maximum after two cycles.                      |                        |

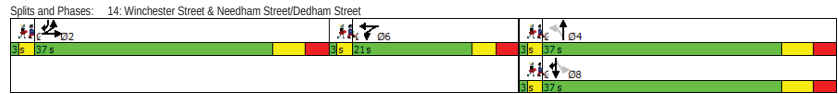
| Case 1: 20. Personen (100% > 10 Personen) - 100% > 10 Personen |     | Case 2: 20. Personen (100% > 10 Personen) - 100% > 10 Personen |     |
|----------------------------------------------------------------|-----|----------------------------------------------------------------|-----|
| 36s                                                            | 71s | 36s                                                            | 71s |
| 36s                                                            | 71s | 36s                                                            | 71s |
| 36s                                                            | 71s | 36s                                                            | 71s |

2025 Build Conditions without Shuttle Service  
Timing Plan: Weekday Evening

| Intersection Summary               |                                                               |
|------------------------------------|---------------------------------------------------------------|
| Area Type:                         | Other                                                         |
| Cycle Length:                      | 104                                                           |
| Actuated Cycle Length:             | 93.2                                                          |
| Natural Cycle:                     | 95                                                            |
| Control Type:                      | Actuated-Uncoordinated                                        |
| Maximum v/c Ratio:                 | 1.09                                                          |
| Intersection Signal Delay:         | 38.3                                                          |
| Intersection Capacity Utilization: | 97.5%                                                         |
| Analysis Period (min):             | 15                                                            |
| ~                                  | Volume exceeds capacity, queue is theoretically infinite.     |
|                                    | Queue shown is maximum after two cycles.                      |
| #                                  | 95th percentile volume exceeds capacity, queue may be longer. |
|                                    | Queue shown is maximum after two cycles.                      |

Lanes, Volumes, Timings  
VHB/MSD

12239.00 :: Needham Street  
14: Winchester Street & Needham Street/Dedham Street  
2025 Build Conditions without Shuttle Service  
Timing Plan: Weekday Evening

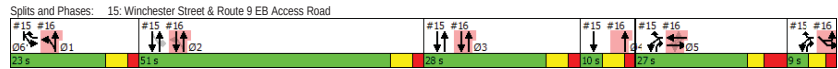


12239.00 :: Needham Street  
15: Winchester Street & Route 9 EB Access Road  
2025 Build Conditions without Shuttle Service  
Timing Plan: Weekday Evening

| Lane Group                                                        | WBL                    | WBR    | NBT   | NBR    | SBL    | SBT     | Ø2   | Ø3   | Ø4   | Ø5   | Ø6   |
|-------------------------------------------------------------------|------------------------|--------|-------|--------|--------|---------|------|------|------|------|------|
| Lane Configurations                                               | ↰                      | ↱      | ↰     | ↱      | ↰      | ↱       |      |      |      |      |      |
| Traffic Volume (vph)                                              | 55                     | 140    | 1055  | 310    | 125    | 1060    |      |      |      |      |      |
| Future Volume (vph)                                               | 55                     | 140    | 1055  | 310    | 125    | 1060    |      |      |      |      |      |
| Ideal Flow (vphpl)                                                | 1900                   | 1900   | 1900  | 1900   | 1900   | 1900    |      |      |      |      |      |
| Storage Length (ft)                                               | 200                    | 0      |       | 100    | 0      |         |      |      |      |      |      |
| Storage Lanes                                                     | 1                      | 1      |       | 1      | 1      |         |      |      |      |      |      |
| Taper Length (ft)                                                 | 25                     |        |       |        | 25     |         |      |      |      |      |      |
| Satd. Flow (prot)                                                 | 1787                   | 1599   | 1900  | 1615   | 1787   | 1881    |      |      |      |      |      |
| Flt Permitted                                                     | 0.950                  |        |       |        | 0.089  |         |      |      |      |      |      |
| Satd. Flow (perm)                                                 | 1787                   | 1599   | 1900  | 1527   | 167    | 1881    |      |      |      |      |      |
| Right Turn on Red                                                 |                        | Yes    |       | Yes    |        |         |      |      |      |      |      |
| Satd. Flow (RTOR)                                                 |                        | 105    |       | 71     |        |         |      |      |      |      |      |
| Link Speed (mph)                                                  | 30                     |        | 30    |        | 30     |         |      |      |      |      |      |
| Link Distance (ft)                                                | 443                    |        | 400   |        | 252    |         |      |      |      |      |      |
| Travel Time (s)                                                   | 10.1                   |        | 9.1   |        | 5.7    |         |      |      |      |      |      |
| Confl. Peds. (#/hr)                                               |                        |        |       | 9      | 9      |         |      |      |      |      |      |
| Peak Hour Factor                                                  | 0.92                   | 0.92   | 0.92  | 0.92   | 0.92   | 0.92    |      |      |      |      |      |
| Heavy Vehicles (%)                                                | 1%                     | 1%     | 0%    | 0%     | 1%     | 1%      |      |      |      |      |      |
| Shared Lane Traffic (%)                                           |                        |        |       |        |        |         |      |      |      |      |      |
| Lane Group Flow (vph)                                             | 60                     | 152    | 1147  | 337    | 136    | 1152    |      |      |      |      |      |
| Turn Type                                                         | Prot                   | custom | NA    | custom | custom | NA      |      |      |      |      |      |
| Protected Phases                                                  | 5 6                    | 1 5 6  | 2 3   | 5 6    | 1      | 1 2 3 4 | 2    | 3    | 4    | 5    | 6    |
| Permitted Phases                                                  |                        |        |       | 2      | 2      |         |      |      |      |      |      |
| Detector Phase                                                    | 5 6                    | 1 5 6  | 2 3   | 5 6    | 1      | 1 2 3 4 |      |      |      |      |      |
| Switch Phase                                                      |                        |        |       |        |        |         |      |      |      |      |      |
| Minimum Initial (s)                                               |                        |        |       |        | 4.0    |         | 10.0 | 10.0 | 4.0  | 4.0  | 4.0  |
| Minimum Split (s)                                                 |                        |        |       |        | 10.0   |         | 25.0 | 27.0 | 10.0 | 11.0 | 9.0  |
| Total Split (s)                                                   |                        |        |       |        | 23.0   |         | 51.0 | 28.0 | 10.0 | 27.0 | 9.0  |
| Total Split (%)                                                   |                        |        |       |        | 15.5%  |         | 34%  | 19%  | 7%   | 18%  | 6%   |
| Yellow Time (s)                                                   |                        |        |       |        | 4.0    |         | 4.0  | 4.0  | 4.0  | 3.0  | 3.0  |
| All-Red Time (s)                                                  |                        |        |       |        | 2.0    |         | 2.0  | 2.0  | 2.0  | 4.0  | 2.0  |
| Lost Time Adjust (s)                                              |                        |        |       |        | 0.0    |         |      |      |      |      |      |
| Total Lost Time (s)                                               |                        |        |       |        | 6.0    |         |      |      |      |      |      |
| Lead/Lag                                                          |                        |        |       |        | Lead   |         | Lag  | Lead | Lag  | Lead | Lag  |
| Lead-Lag Optimize?                                                |                        |        |       |        |        |         |      |      |      |      |      |
| Recall Mode                                                       |                        |        |       |        | None   |         | None | None | None | None | None |
| Act Effct Green (s)                                               | 28.3                   | 52.3   | 73.0  | 72.3   | 62.0   | 106.0   |      |      |      |      |      |
| Actuated g/C Ratio                                                | 0.19                   | 0.36   | 0.50  | 0.49   | 0.42   | 0.72    |      |      |      |      |      |
| v/c Ratio                                                         | 0.17                   | 0.24   | 1.22  | 0.42   | 0.53   | 0.85    |      |      |      |      |      |
| Control Delay                                                     | 51.2                   | 12.3   | 141.8 | 11.3   | 47.7   | 10.3    |      |      |      |      |      |
| Queue Delay                                                       | 0.0                    | 0.1    | 0.1   | 0.0    | 3.4    | 48.6    |      |      |      |      |      |
| Total Delay                                                       | 51.2                   | 12.4   | 141.9 | 11.3   | 51.1   | 59.0    |      |      |      |      |      |
| LOS                                                               | D                      | B      | F     | B      | D      | E       |      |      |      |      |      |
| Approach Delay                                                    | 23.4                   |        | 112.2 |        |        | 58.1    |      |      |      |      |      |
| Approach LOS                                                      | C                      |        | F     |        |        | E       |      |      |      |      |      |
| Queue Length 50th (ft)                                            | 49                     | 30     | ~1357 | 87     | 94     | 170     |      |      |      |      |      |
| Queue Length 95th (ft)                                            | 93                     | 83     | #1623 | 132    | m69    | m135    |      |      |      |      |      |
| Internal Link Dist (ft)                                           | 363                    |        | 320   |        |        | 172     |      |      |      |      |      |
| Turn Bay Length (ft)                                              | 200                    |        |       | 100    |        |         |      |      |      |      |      |
| Base Capacity (vph)                                               | 334                    | 630    | 941   | 795    | 257    | 1353    |      |      |      |      |      |
| Starvation Cap Reductn                                            | 0                      | 0      | 0     | 0      | 59     | 453     |      |      |      |      |      |
| Spillback Cap Reductn                                             | 0                      | 79     | 25    | 0      | 0      | 0       |      |      |      |      |      |
| Storage Cap Reductn                                               | 0                      | 0      | 0     | 0      | 0      | 0       |      |      |      |      |      |
| Reduced v/c Ratio                                                 | 0.18                   | 0.28   | 1.25  | 0.42   | 0.69   | 1.28    |      |      |      |      |      |
| Intersection Summary                                              |                        |        |       |        |        |         |      |      |      |      |      |
| Area Type:                                                        | Other                  |        |       |        |        |         |      |      |      |      |      |
| Cycle Length:                                                     | 148                    |        |       |        |        |         |      |      |      |      |      |
| Actuated Cycle Length:                                            | 147.3                  |        |       |        |        |         |      |      |      |      |      |
| Natural Cycle:                                                    | 145                    |        |       |        |        |         |      |      |      |      |      |
| Control Type:                                                     | Actuated-Uncoordinated |        |       |        |        |         |      |      |      |      |      |
| Maximum v/c Ratio:                                                | 1.32                   |        |       |        |        |         |      |      |      |      |      |
| Intersection Signal Delay:                                        | 82.6                   |        |       |        |        |         |      |      |      |      |      |
| Intersection Capacity Utilization                                 | 81.6%                  |        |       |        |        |         |      |      |      |      |      |
|                                                                   | Intersection LOS: F    |        |       |        |        |         |      |      |      |      |      |
|                                                                   | ICU Level of Service D |        |       |        |        |         |      |      |      |      |      |
| Analysis Period (min)                                             | 15                     |        |       |        |        |         |      |      |      |      |      |
| - Volume exceeds capacity, queue is theoretically infinite.       |                        |        |       |        |        |         |      |      |      |      |      |
| - Queue shown is maximum after two cycles.                        |                        |        |       |        |        |         |      |      |      |      |      |
| # 95th percentile volume exceeds capacity, queue may be longer.   |                        |        |       |        |        |         |      |      |      |      |      |
| - Queue shown is maximum after two cycles.                        |                        |        |       |        |        |         |      |      |      |      |      |
| m Volume for 95th percentile queue is metered by upstream signal. |                        |        |       |        |        |         |      |      |      |      |      |

12239.00 :: Needham Street  
15: Winchester Street & Route 9 EB Access Road

2025 Build Conditions without Shuttle Service  
Timing Plan: Weekday Evening

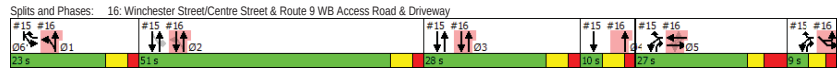


12239.00 :: Needham Street  
16: Winchester Street/Centre Street & Route 9 WB Access Road & Driveway

2025 Build Conditions without Shuttle Service  
Timing Plan: Weekday Evening

| Lane Group                                                        | EBL   | EBT   | EBR  | WBL   | WBT   | WBR2 | NBL2   | NBT  | SBT   | SBR   | SEL  | SER  | Ø2   | Ø3   | Ø4   |
|-------------------------------------------------------------------|-------|-------|------|-------|-------|------|--------|------|-------|-------|------|------|------|------|------|
| Lane Configurations                                               |       | EBT   | EBR  | WBL   | WBT   | WBR2 | NBL2   | NBT  | SBT   | SBR   | SEL  | SER  |      |      |      |
| Traffic Volume (vph)                                              | 5     | 0     | 35   | 155   | 10    | 20   | 155    | 1040 | 995   | 115   | 0    | 1    |      |      |      |
| Future Volume (vph)                                               | 5     | 0     | 35   | 155   | 10    | 20   | 155    | 1040 | 995   | 115   | 0    | 1    |      |      |      |
| Ideal Flow (vphpl)                                                | 1900  | 1900  | 1900 | 1900  | 1900  | 1900 | 1900   | 1900 | 1900  | 1900  | 1900 | 1900 |      |      |      |
| Storage Length (ft)                                               | 0     |       | 0    | 100   |       |      |        |      |       |       | 0    | 0    |      |      |      |
| Storage Lanes                                                     | 0     |       | 0    | 1     |       |      |        |      |       |       | 0    | 1    |      |      |      |
| Taper Length (ft)                                                 | 25    |       |      | 25    |       |      |        |      |       |       | 25   |      |      |      |      |
| Satd. Flow (prot)                                                 | 0     | 1664  | 0    | 1805  | 1710  | 0    | 1805   | 1900 | 1841  | 0     | 1611 | 0    |      |      |      |
| Flt Permitted                                                     |       | 0.970 |      | 0.729 |       |      | 0.089  |      |       |       |      |      |      |      |      |
| Satd. Flow (perm)                                                 | 0     | 1624  | 0    | 1385  | 1710  | 0    | 169    | 1900 | 1841  | 0     | 1611 | 0    |      |      |      |
| Right Turn on Red                                                 |       |       | Yes  |       | Yes   |      |        |      |       |       |      |      |      |      |      |
| Satd. Flow (RTOR)                                                 |       | 192   |      |       | 192   |      |        |      |       |       |      |      |      |      |      |
| Link Speed (mph)                                                  |       | 30    |      |       | 30    |      |        | 30   | 30    |       | 30   |      |      |      |      |
| Link Distance (ft)                                                |       | 401   |      |       | 460   |      |        | 252  | 508   |       | 171  |      |      |      |      |
| Travel Time (s)                                                   |       | 9.1   |      |       | 10.5  |      |        | 5.7  | 11.5  |       | 3.9  |      |      |      |      |
| Confl. Peds. (#/hr)                                               |       |       |      |       |       |      | 14     |      |       | 14    |      |      |      |      |      |
| Confl. Bikes (#/hr)                                               |       |       |      |       |       |      |        |      |       |       |      |      |      |      |      |
| Peak Hour Factor                                                  | 0.92  | 0.92  | 0.92 | 0.92  | 0.92  | 0.92 | 0.92   | 0.92 | 0.92  | 0.92  | 0.92 | 0.92 |      |      |      |
| Heavy Vehicles (%)                                                | 0%    | 0%    | 0%   | 0%    | 0%    | 0%   | 0%     | 0%   | 1%    | 1%    | 2%   | 2%   |      |      |      |
| Shared Lane Traffic (%)                                           |       |       |      |       |       |      |        |      |       |       |      |      |      |      |      |
| Lane Group Flow (vph)                                             | 0     | 43    | 0    | 168   | 33    | 0    | 168    | 1130 | 1207  | 0     | 1    | 0    |      |      |      |
| Turn Type                                                         | Perm  | NA    |      | Perm  | NA    |      | custom | NA   | NA    |       | Prot |      |      |      |      |
| Protected Phases                                                  |       | 5     |      |       | 5     |      | 1      | 1    | 2     | 3     | 4    |      |      |      |      |
| Permitted Phases                                                  |       | 5     |      | 5     |       |      | 2      |      |       |       |      |      |      |      |      |
| Detector Phase                                                    |       | 5     | 5    | 5     | 5     |      | 1      | 1    | 2     | 3     | 4    |      | 2    | 3    | 4    |
| Switch Phase                                                      |       |       |      |       |       |      |        |      |       |       |      |      |      |      |      |
| Minimum Initial (s)                                               | 4.0   | 4.0   |      | 4.0   | 4.0   |      | 4.0    |      |       |       | 4.0  |      | 10.0 | 10.0 | 4.0  |
| Minimum Split (s)                                                 | 11.0  | 11.0  |      | 11.0  | 11.0  |      | 10.0   |      |       |       | 9.0  |      | 25.0 | 27.0 | 10.0 |
| Total Split (s)                                                   | 27.0  | 27.0  |      | 27.0  | 27.0  |      | 23.0   |      |       |       | 9.0  |      | 51.0 | 28.0 | 10.0 |
| Total Split (%)                                                   | 18.2% | 18.2% |      | 18.2% | 18.2% |      | 15.5%  |      |       |       | 6.1% |      | 34%  | 19%  | 7%   |
| Yellow Time (s)                                                   | 3.0   | 3.0   |      | 3.0   | 3.0   |      | 4.0    |      |       |       | 3.0  |      | 4.0  | 4.0  | 4.0  |
| All-Red Time (s)                                                  | 4.0   | 4.0   |      | 4.0   | 4.0   |      | 2.0    |      |       |       | 2.0  |      | 2.0  | 2.0  | 2.0  |
| Lost Time Adjust (s)                                              |       | 0.0   |      | 0.0   | 0.0   |      | 0.0    |      |       |       | 0.0  |      |      |      |      |
| Total Lost Time (s)                                               |       | 7.0   |      | 7.0   | 7.0   |      | 6.0    |      |       |       | 5.0  |      |      |      |      |
| Lead/Lag                                                          | Lead  | Lead  |      | Lead  | Lead  |      | Lead   |      |       |       | Lag  |      | Lag  | Lead | Lag  |
| Lead-Lag Optimize?                                                |       |       |      |       |       |      |        |      |       |       |      |      |      |      |      |
| Recall Mode                                                       | None  | None  |      | None  | None  |      | None   |      |       |       | None |      | None | None | None |
| Act Effct Green (s)                                               | 19.3  | 19.3  |      | 19.3  | 19.3  |      | 62.0   |      | 106.0 | 73.0  | 4.0  |      |      |      |      |
| Actuated g/C Ratio                                                | 0.13  | 0.13  |      | 0.13  | 0.13  |      | 0.42   |      | 0.72  | 0.50  | 0.03 |      |      |      |      |
| v/c Ratio                                                         | 0.11  | 0.93  |      | 0.08  | 0.65  |      | 0.83   |      | 1.32  | 0.02  |      |      |      |      |      |
| Control Delay                                                     | 0.6   | 112.6 |      | 0.4   | 56.6  |      | 10.3   |      | 185.3 | 71.0  |      |      |      |      |      |
| Queue Delay                                                       | 0.1   | 53.2  |      | 0.0   | 7.7   |      | 43.6   |      | 1.0   | 0.0   |      |      |      |      |      |
| Total Delay                                                       | 0.7   | 165.9 |      | 0.4   | 64.3  |      | 54.0   |      | 186.3 | 71.0  |      |      |      |      |      |
| LOS                                                               | A     | F     |      | A     | E     |      | D      |      | F     | E     |      |      |      |      |      |
| Approach Delay                                                    | 0.7   |       |      | 138.7 |       |      | 55.3   |      | 186.3 | 71.0  |      |      |      |      |      |
| Approach LOS                                                      | A     |       |      | F     |       |      | E      |      | F     | E     |      |      |      |      |      |
| Queue Length 50th (ft)                                            | 0     |       |      | 162   | 0     |      | 124    |      | ~1507 | 1     |      |      |      |      |      |
| Queue Length 95th (ft)                                            | 0     |       |      | #305  | 0     |      | m107   |      | m68   | #1773 | 8    |      |      |      |      |
| Internal Link Dist (ft)                                           | 321   |       |      |       | 380   |      |        |      | 172   | 428   | 91   |      |      |      |      |
| Turn Bay Length (ft)                                              |       |       |      | 100   |       |      |        |      |       |       |      |      |      |      |      |
| Base Capacity (vph)                                               | 386   |       |      | 188   | 398   |      | 259    |      | 1367  | 912   | 43   |      |      |      |      |
| Starvation Cap Reductn                                            | 0     |       |      | 0     | 0     |      | 57     |      | 329   | 151   | 0    |      |      |      |      |
| Spillback Cap Reductn                                             | 68    |       |      | 42    | 0     |      | 0      |      | 0     | 12    | 0    |      |      |      |      |
| Storage Cap Reductn                                               | 0     |       |      | 0     | 0     |      | 0      |      | 0     | 0     | 0    |      |      |      |      |
| Reduced v/c Ratio                                                 | 0.14  |       |      | 1.15  | 0.08  |      | 0.83   |      | 1.09  | 1.59  | 0.02 |      |      |      |      |
| Intersection Summary                                              |       |       |      |       |       |      |        |      |       |       |      |      |      |      |      |
| Area Type: Other                                                  |       |       |      |       |       |      |        |      |       |       |      |      |      |      |      |
| Cycle Length: 148                                                 |       |       |      |       |       |      |        |      |       |       |      |      |      |      |      |
| Actuated Cycle Length: 147.3                                      |       |       |      |       |       |      |        |      |       |       |      |      |      |      |      |
| Natural Cycle: 145                                                |       |       |      |       |       |      |        |      |       |       |      |      |      |      |      |
| Control Type: Actuated-Uncoordinated                              |       |       |      |       |       |      |        |      |       |       |      |      |      |      |      |
| Maximum v/c Ratio: 1.32                                           |       |       |      |       |       |      |        |      |       |       |      |      |      |      |      |
| Intersection Signal Delay: 118.0                                  |       |       |      |       |       |      |        |      |       |       |      |      |      |      |      |
| Intersection Capacity Utilization 106.7%                          |       |       |      |       |       |      |        |      |       |       |      |      |      |      |      |
| Analysis Period (min) 15                                          |       |       |      |       |       |      |        |      |       |       |      |      |      |      |      |
| Volume exceeds capacity, queue is theoretically infinite.         |       |       |      |       |       |      |        |      |       |       |      |      |      |      |      |
| Queue shown is maximum after two cycles.                          |       |       |      |       |       |      |        |      |       |       |      |      |      |      |      |
| # 95th percentile volume exceeds capacity, queue may be longer.   |       |       |      |       |       |      |        |      |       |       |      |      |      |      |      |
| Queue shown is maximum after two cycles.                          |       |       |      |       |       |      |        |      |       |       |      |      |      |      |      |
| m Volume for 95th percentile queue is metered by upstream signal. |       |       |      |       |       |      |        |      |       |       |      |      |      |      |      |

12239.00 :: Needham Street  
16: Winchester Street/Centre Street & Route 9 WB Access Road & Driveway  
2025 Build Conditions without Shuttle Service  
Timing Plan: Weekday Evening

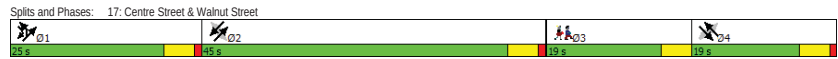


12239.00 :: Needham Street  
17: Centre Street & Walnut Street  
2025 Build Conditions without Shuttle Service  
Timing Plan: Weekday Evening

| Lane Group                                                      | SEL                    | SET   | SER   | NWL   | NWT   | NWR  | NEL                 | NET  | NER   | SWL   | SWT   | SWR  | Ø3 |
|-----------------------------------------------------------------|------------------------|-------|-------|-------|-------|------|---------------------|------|-------|-------|-------|------|----|
| Lane Configurations                                             |                        |       |       |       |       |      |                     |      |       |       |       |      |    |
| Traffic Volume (vph)                                            | 30                     | 2     | 445   | 15    | 50    | 0    | 435                 | 620  | 10    | 2     | 650   | 60   |    |
| Future Volume (vph)                                             | 30                     | 2     | 445   | 15    | 50    | 0    | 435                 | 620  | 10    | 2     | 650   | 60   |    |
| Ideal Flow (vphpl)                                              | 1900                   | 1900  | 1900  | 1900  | 1900  | 1900 | 1900                | 1900 | 1900  | 1900  | 1900  | 1900 |    |
| Storage Length (ft)                                             | 0                      |       | 50    | 0     |       | 0    | 75                  | 0    |       | 0     | 0     | 0    |    |
| Storage Lanes                                                   | 0                      |       | 1     | 0     |       | 0    | 1                   | 0    |       | 0     | 0     | 0    |    |
| Taper Length (ft)                                               | 25                     |       |       | 25    |       |      | 25                  |      |       | 25    |       |      |    |
| Satd. Flow (prot)                                               | 0                      | 1814  | 1615  | 0     | 1879  | 0    | 1787                | 1877 | 0     | 0     | 1857  | 0    |    |
| Flt Permitted                                                   |                        | 0.740 |       |       | 0.919 |      | 0.206               |      |       |       | 0.999 |      |    |
| Satd. Flow (perm)                                               | 0                      | 1360  | 1558  | 0     | 1731  | 0    | 387                 | 1877 | 0     | 0     | 1855  | 0    |    |
| Right Turn on Red                                               |                        |       | No    |       |       | No   |                     |      | Yes   |       |       | Yes  |    |
| Satd. Flow (RTOR)                                               |                        |       |       |       |       |      |                     | 1    |       |       | 5     |      |    |
| Link Speed (mph)                                                |                        | 30    |       |       | 30    |      |                     | 30   |       |       | 30    |      |    |
| Link Distance (ft)                                              |                        | 624   |       |       | 387   |      |                     | 508  |       |       | 531   |      |    |
| Travel Time (s)                                                 |                        | 14.2  |       |       | 8.8   |      |                     | 11.5 |       |       | 12.1  |      |    |
| Confl. Peds. (#/hr)                                             | 11                     |       | 10    | 10    |       | 11   | 4                   |      | 8     | 8     |       | 4    |    |
| Peak Hour Factor                                                | 0.92                   | 0.92  | 0.92  | 0.92  | 0.92  | 0.92 | 0.92                | 0.92 | 0.92  | 0.92  | 0.92  | 0.92 |    |
| Heavy Vehicles (%)                                              | 0%                     | 0%    | 0%    | 0%    | 0%    | 0%   | 1%                  | 1%   | 1%    | 1%    | 1%    | 1%   |    |
| Shared Lane Traffic (%)                                         |                        |       |       |       |       |      |                     |      |       |       |       |      |    |
| Lane Group Flow (vph)                                           | 0                      | 35    | 484   | 0     | 70    | 0    | 473                 | 685  | 0     | 0     | 774   | 0    |    |
| Turn Type                                                       | Perm                   | NA    | pm+ov | Perm  | NA    |      | D,P+P               | NA   | Perm  | NA    |       |      |    |
| Protected Phases                                                |                        | 4     | 1     |       | 4     |      | 1                   | 1 2  |       |       | 2     | 3    |    |
| Permitted Phases                                                | 4                      |       | 4     | 4     |       |      | 2                   |      |       | 2     |       |      |    |
| Detector Phase                                                  | 4                      | 4     | 1     | 4     | 4     |      | 1                   | 1 2  |       | 2     | 2     |      |    |
| Switch Phase                                                    |                        |       |       |       |       |      |                     |      |       |       |       |      |    |
| Minimum Initial (s)                                             | 9.0                    | 9.0   | 7.0   | 9.0   | 9.0   |      | 7.0                 |      | 6.0   | 6.0   |       | 4.0  |    |
| Minimum Split (s)                                               | 14.0                   | 14.0  | 12.0  | 14.0  | 14.0  |      | 12.0                |      | 11.0  | 11.0  |       | 19.0 |    |
| Total Split (s)                                                 | 19.0                   | 19.0  | 25.0  | 19.0  | 19.0  |      | 25.0                |      | 45.0  | 45.0  |       | 19.0 |    |
| Total Split (%)                                                 | 17.6%                  | 17.6% | 23.1% | 17.6% | 17.6% |      | 23.1%               |      | 41.7% | 41.7% |       | 18%  |    |
| Yellow Time (s)                                                 | 4.0                    | 4.0   | 4.0   | 4.0   | 4.0   |      | 4.0                 |      | 4.0   | 4.0   |       | 4.0  |    |
| All-Red Time (s)                                                | 1.0                    | 1.0   | 1.0   | 1.0   | 1.0   |      | 1.0                 |      | 1.0   | 1.0   |       | 0.0  |    |
| Lost Time Adjust (s)                                            | 0.0                    | 0.0   | 0.0   | 0.0   | 0.0   |      | 0.0                 |      | 0.0   | 0.0   |       | 0.0  |    |
| Total Lost Time (s)                                             | 5.0                    | 5.0   |       | 5.0   | 5.0   |      | 5.0                 |      |       | 5.0   |       |      |    |
| Lead/Lag                                                        | Lag                    | Lag   | Lead  | Lag   | Lag   |      | Lead                |      | Lag   | Lag   |       | Lead |    |
| Lead-Lag Optimize?                                              |                        |       |       |       |       |      |                     |      |       |       |       |      |    |
| Recall Mode                                                     | Min                    | Min   | Max   | Min   | Min   |      | Max                 |      | Max   | Max   |       | None |    |
| Act Effct Green (s)                                             | 9.9                    | 30.1  |       | 9.9   | 60.7  |      | 65.8                |      |       | 40.5  |       |      |    |
| Actuated g/C Ratio                                              | 0.10                   | 0.31  |       | 0.10  | 0.63  |      | 0.68                |      |       | 0.42  |       |      |    |
| v/c Ratio                                                       | 0.25                   | 0.97  |       | 0.40  | 0.88  |      | 0.53                |      |       | 0.99  |       |      |    |
| Control Delay                                                   | 47.6                   | 67.7  |       | 50.1  | 38.0  |      | 11.5                |      |       | 60.5  |       |      |    |
| Queue Delay                                                     | 0.0                    | 0.0   |       | 0.0   | 0.0   |      | 1.1                 |      |       | 0.0   |       |      |    |
| Total Delay                                                     | 47.6                   | 67.7  |       | 50.1  | 38.0  |      | 12.6                |      |       | 60.5  |       |      |    |
| LOS                                                             | D                      | E     |       | D     | D     |      | B                   |      |       | E     |       |      |    |
| Approach Delay                                                  | 66.3                   |       |       | 50.1  |       |      | 22.9                |      |       | 60.5  |       |      |    |
| Approach LOS                                                    | E                      |       |       | D     |       |      | C                   |      |       | E     |       |      |    |
| Queue Length 50th (ft)                                          | 22                     | ~335  |       | 45    | 198   |      | 240                 |      |       | ~566  |       |      |    |
| Queue Length 95th (ft)                                          | 54                     | #546  |       | 89    | #425  |      | 374                 |      |       | #836  |       |      |    |
| Internal Link Dist (ft)                                         | 544                    |       |       | 307   |       |      | 428                 |      |       | 451   |       |      |    |
| Turn Bay Length (ft)                                            |                        | 50    |       |       | 75    |      |                     |      |       |       |       |      |    |
| Base Capacity (vph)                                             | 200                    | 499   |       | 254   | 538   |      | 1282                |      |       | 782   |       |      |    |
| Starvation Cap Reductn                                          | 0                      | 0     |       | 0     | 0     |      | 351                 |      |       | 0     |       |      |    |
| Spillback Cap Reductn                                           | 0                      | 0     |       | 0     | 0     |      | 0                   |      |       | 0     |       |      |    |
| Storage Cap Reductn                                             | 0                      | 0     |       | 0     | 0     |      | 0                   |      |       | 0     |       |      |    |
| Reduced v/c Ratio                                               | 0.17                   | 0.97  |       | 0.28  | 0.88  |      | 0.74                |      |       | 0.99  |       |      |    |
| Intersection Summary                                            |                        |       |       |       |       |      |                     |      |       |       |       |      |    |
| Area Type:                                                      | Other                  |       |       |       |       |      |                     |      |       |       |       |      |    |
| Cycle Length: 108                                               |                        |       |       |       |       |      |                     |      |       |       |       |      |    |
| Actuated Cycle Length: 96.3                                     |                        |       |       |       |       |      |                     |      |       |       |       |      |    |
| Natural Cycle: 110                                              |                        |       |       |       |       |      |                     |      |       |       |       |      |    |
| Control Type: Semi Act-Uncoord                                  |                        |       |       |       |       |      |                     |      |       |       |       |      |    |
| Maximum v/c Ratio: 0.99                                         |                        |       |       |       |       |      |                     |      |       |       |       |      |    |
| Intersection Signal Delay: 44.2                                 |                        |       |       |       |       |      | Intersection LOS: D |      |       |       |       |      |    |
| Intersection Capacity Utilization 93.9%                         | ICU Level of Service F |       |       |       |       |      |                     |      |       |       |       |      |    |
| Analysis Period (min) 15                                        |                        |       |       |       |       |      |                     |      |       |       |       |      |    |
| ~ Volume exceeds capacity, queue is theoretically infinite.     |                        |       |       |       |       |      |                     |      |       |       |       |      |    |
| Queue shown is maximum after two cycles.                        |                        |       |       |       |       |      |                     |      |       |       |       |      |    |
| # 95th percentile volume exceeds capacity, queue may be longer. |                        |       |       |       |       |      |                     |      |       |       |       |      |    |
| Queue shown is maximum after two cycles.                        |                        |       |       |       |       |      |                     |      |       |       |       |      |    |



12239.00 :: Needham Street  
17: Centre Street & Walnut Street  
2025 Build Conditions without Shuttle Service  
Timing Plan: Weekday Evening

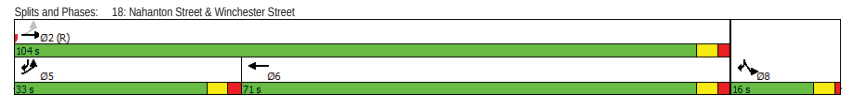


12239.00 :: Needham Street  
18: Nahanton Street & Winchester Street  
2025 Build Conditions without Shuttle Service  
Timing Plan: Weekday Evening

|                         |  |  |  |  |  |  |
|-------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
| Lane Group              | EBL                                                                                 | EBT                                                                                 | WBT                                                                                 | WBR                                                                                 | SBL                                                                                 | SBR                                                                                 |
| Lane Configurations     |  |  |  |                                                                                     |  |  |
| Traffic Volume (vph)    | 400                                                                                 | 645                                                                                 | 470                                                                                 | 50                                                                                  | 85                                                                                  | 350                                                                                 |
| Future Volume (vph)     | 400                                                                                 | 645                                                                                 | 470                                                                                 | 50                                                                                  | 85                                                                                  | 350                                                                                 |
| Ideal Flow (vphpl)      | 1900                                                                                | 1900                                                                                | 1900                                                                                | 1900                                                                                | 1900                                                                                | 1900                                                                                |
| Storage Length (ft)     | 175                                                                                 |                                                                                     |                                                                                     |                                                                                     | 0                                                                                   | 75                                                                                  |
| Storage Lanes           | 1                                                                                   |                                                                                     |                                                                                     | 0                                                                                   | 1                                                                                   | 1                                                                                   |
| Taper Length (ft)       | 25                                                                                  |                                                                                     |                                                                                     |                                                                                     | 25                                                                                  |                                                                                     |
| Satd. Flow (prot)       | 1805                                                                                | 1900                                                                                | 1875                                                                                | 0                                                                                   | 1805                                                                                | 1615                                                                                |
| Flt Permitted           | 0.288                                                                               |                                                                                     |                                                                                     |                                                                                     | 0.950                                                                               |                                                                                     |
| Satd. Flow (perm)       | 547                                                                                 | 1900                                                                                | 1875                                                                                | 0                                                                                   | 1805                                                                                | 1615                                                                                |
| Right Turn on Red       |                                                                                     |                                                                                     |                                                                                     | Yes                                                                                 |                                                                                     | No                                                                                  |
| Satd. Flow (RTOR)       |                                                                                     |                                                                                     | 7                                                                                   |                                                                                     |                                                                                     |                                                                                     |
| Link Speed (mph)        |                                                                                     | 30                                                                                  | 30                                                                                  |                                                                                     | 30                                                                                  |                                                                                     |
| Link Distance (ft)      |                                                                                     | 963                                                                                 | 734                                                                                 |                                                                                     | 889                                                                                 |                                                                                     |
| Travel Time (s)         |                                                                                     | 21.9                                                                                | 16.7                                                                                |                                                                                     | 20.2                                                                                |                                                                                     |
| Peak Hour Factor        | 0.92                                                                                | 0.92                                                                                | 0.92                                                                                | 0.92                                                                                | 0.92                                                                                | 0.92                                                                                |
| Heavy Vehicles (%)      | 0%                                                                                  | 0%                                                                                  | 0%                                                                                  | 0%                                                                                  | 0%                                                                                  | 0%                                                                                  |
| Shared Lane Traffic (%) |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Lane Group Flow (vph)   | 435                                                                                 | 701                                                                                 | 565                                                                                 | 0                                                                                   | 92                                                                                  | 380                                                                                 |
| Turn Type               | pm+pt                                                                               | NA                                                                                  | NA                                                                                  |                                                                                     | Prot                                                                                | pt+ov                                                                               |
| Protected Phases        | 5                                                                                   | 2                                                                                   | 6                                                                                   |                                                                                     | 8                                                                                   | 5 8                                                                                 |
| Permitted Phases        | 2                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Detector Phase          | 5                                                                                   | 2                                                                                   | 6                                                                                   |                                                                                     | 8                                                                                   | 5 8                                                                                 |
| Switch Phase            |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Minimum Initial (s)     | 6.0                                                                                 | 10.0                                                                                | 10.0                                                                                |                                                                                     | 6.0                                                                                 |                                                                                     |
| Minimum Split (s)       | 11.0                                                                                | 15.0                                                                                | 23.0                                                                                |                                                                                     | 10.0                                                                                |                                                                                     |
| Total Split (s)         | 33.0                                                                                | 104.0                                                                               | 71.0                                                                                |                                                                                     | 16.0                                                                                |                                                                                     |
| Total Split (%)         | 27.5%                                                                               | 86.7%                                                                               | 59.2%                                                                               |                                                                                     | 13.3%                                                                               |                                                                                     |
| Yellow Time (s)         | 3.0                                                                                 | 3.0                                                                                 | 3.0                                                                                 |                                                                                     | 3.0                                                                                 |                                                                                     |
| All-Red Time (s)        | 2.0                                                                                 | 2.0                                                                                 | 2.0                                                                                 |                                                                                     | 1.0                                                                                 |                                                                                     |
| Lost Time Adjust (s)    | 0.0                                                                                 | 0.0                                                                                 | 0.0                                                                                 |                                                                                     | 0.0                                                                                 |                                                                                     |
| Total Lost Time (s)     | 5.0                                                                                 | 5.0                                                                                 | 5.0                                                                                 |                                                                                     | 4.0                                                                                 |                                                                                     |
| Lead/Lag                | Lead                                                                                |                                                                                     | Lag                                                                                 |                                                                                     |                                                                                     |                                                                                     |
| Lead-Lag Optimize?      | Yes                                                                                 |                                                                                     | Yes                                                                                 |                                                                                     |                                                                                     |                                                                                     |
| Recall Mode             | None                                                                                | C-Min                                                                               | None                                                                                |                                                                                     | None                                                                                |                                                                                     |
| Act Effct Green (s)     | 86.9                                                                                | 86.9                                                                                | 64.7                                                                                |                                                                                     | 24.1                                                                                | 45.3                                                                                |
| Actuated g/C Ratio      | 0.72                                                                                | 0.72                                                                                | 0.54                                                                                |                                                                                     | 0.20                                                                                | 0.38                                                                                |
| v/c Ratio               | 0.76                                                                                | 0.51                                                                                | 0.56                                                                                |                                                                                     | 0.25                                                                                | 0.62                                                                                |
| Control Delay           | 15.8                                                                                | 8.9                                                                                 | 21.7                                                                                |                                                                                     | 42.4                                                                                | 34.9                                                                                |
| Queue Delay             | 0.0                                                                                 | 0.0                                                                                 | 0.0                                                                                 |                                                                                     | 0.0                                                                                 | 0.0                                                                                 |
| Total Delay             | 15.8                                                                                | 8.9                                                                                 | 21.7                                                                                |                                                                                     | 42.4                                                                                | 34.9                                                                                |
| LOS                     | B                                                                                   | A                                                                                   | C                                                                                   |                                                                                     | D                                                                                   | C                                                                                   |
| Approach Delay          |                                                                                     | 11.6                                                                                | 21.7                                                                                |                                                                                     | 36.3                                                                                |                                                                                     |
| Approach LOS            |                                                                                     | B                                                                                   | C                                                                                   |                                                                                     | D                                                                                   |                                                                                     |
| Queue Length 50th (ft)  |                                                                                     | 117                                                                                 | 228                                                                                 |                                                                                     | 59                                                                                  | 227                                                                                 |
| Queue Length 95th (ft)  |                                                                                     | 142                                                                                 | 247                                                                                 |                                                                                     | 114                                                                                 | 338                                                                                 |
| Internal Link Dist (ft) |                                                                                     | 883                                                                                 | 654                                                                                 |                                                                                     | 809                                                                                 |                                                                                     |
| Turn Bay Length (ft)    | 175                                                                                 |                                                                                     |                                                                                     |                                                                                     | 75                                                                                  |                                                                                     |
| Base Capacity (vph)     | 689                                                                                 | 1567                                                                                | 1066                                                                                |                                                                                     | 362                                                                                 | 754                                                                                 |
| Starvation Cap Reductn  | 0                                                                                   | 0                                                                                   | 0                                                                                   |                                                                                     | 0                                                                                   | 0                                                                                   |
| Spillback Cap Reductn   | 0                                                                                   | 0                                                                                   | 0                                                                                   |                                                                                     | 0                                                                                   | 0                                                                                   |
| Storage Cap Reductn     | 0                                                                                   | 0                                                                                   | 0                                                                                   |                                                                                     | 0                                                                                   | 0                                                                                   |
| Reduced v/c Ratio       | 0.63                                                                                | 0.45                                                                                | 0.53                                                                                |                                                                                     | 0.25                                                                                | 0.50                                                                                |

Intersection Summary

|                                    |                                                    |
|------------------------------------|----------------------------------------------------|
| Area Type:                         | Other                                              |
| Cycle Length:                      | 120                                                |
| Actuated Cycle Length:             | 120                                                |
| Offset:                            | 8 (7%), Referenced to phase 2:EBTL, Start of Green |
| Natural Cycle:                     | 60                                                 |
| Control Type:                      | Actuated-Coordinated                               |
| Maximum v/c Ratio:                 | 0.76                                               |
| Intersection Signal Delay:         | 19.6                                               |
| Intersection Capacity Utilization: | 66.6%                                              |
| ICU Level of Service:              | C                                                  |
| Analysis Period (min):             | 15                                                 |



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| Lane Group              | EBL   | EBT   | EBR   | WBL   | WBT   | WBR  | NBL   | NBT   | NBR  | SBL   | SBT   | SBR  |
|-------------------------|-------|-------|-------|-------|-------|------|-------|-------|------|-------|-------|------|
| Lane Configurations     |       |       |       |       |       |      |       |       |      |       |       |      |
| Traffic Volume (vph)    | 45    | 530   | 125   | 170   | 590   | 60   | 510   | 20    | 400  | 115   | 2     | 60   |
| Future Volume (vph)     | 45    | 530   | 125   | 170   | 590   | 60   | 510   | 20    | 400  | 115   | 2     | 60   |
| Ideal Flow (vphpl)      | 1900  | 1900  | 1900  | 1900  | 1900  | 1900 | 1900  | 1900  | 1900 | 1900  | 1900  | 1900 |
| Storage Length (ft)     | 125   |       | 125   | 150   |       | 0    | 0     |       | 0    | 75    |       | 0    |
| Storage Lanes           | 1     |       | 1     |       |       | 0    | 1     |       | 0    | 1     |       | 0    |
| Taper Length (ft)       | 25    |       |       | 25    |       |      | 25    |       |      | 25    |       |      |
| Satd. Flow (prot)       | 1787  | 1881  | 1599  | 1805  | 1870  | 0    | 1805  | 1628  | 0    | 1805  | 1623  | 0    |
| Flt Permitted           | 0.133 |       |       | 0.133 |       |      | 0.713 |       |      | 0.332 |       |      |
| Satd. Flow (perm)       | 250   | 1881  | 1565  | 253   | 1870  | 0    | 1355  | 1628  | 0    | 631   | 1623  | 0    |
| Right Turn on Red       |       |       | Yes   |       |       | Yes  |       |       | Yes  |       |       | Yes  |
| Satd. Flow (RTOR)       |       |       | 80    |       | 6     |      |       | 347   |      |       | 65    |      |
| Link Speed (mph)        |       | 30    |       |       | 30    |      |       | 30    |      |       | 30    |      |
| Link Distance (ft)      |       | 797   |       |       | 963   |      |       | 598   |      |       | 628   |      |
| Travel Time (s)         |       | 18.1  |       |       | 21.9  |      |       | 13.6  |      |       | 14.3  |      |
| Confl. Peds. (#/hr)     | 1     |       | 1     | 1     |       | 1    |       |       |      |       |       |      |
| Peak Hour Factor        | 0.92  | 0.92  | 0.92  | 0.92  | 0.92  | 0.92 | 0.92  | 0.92  | 0.92 | 0.92  | 0.92  | 0.92 |
| Heavy Vehicles (%)      | 1%    | 1%    | 1%    | 0%    | 0%    | 0%   | 0%    | 0%    | 0%   | 0%    | 0%    | 0%   |
| Shared Lane Traffic (%) |       |       |       |       |       |      |       |       |      |       |       |      |
| Lane Group Flow (vph)   | 49    | 576   | 136   | 185   | 706   | 0    | 554   | 457   | 0    | 125   | 67    | 0    |
| Turn Type               | pm+pt | NA    | Perm  | pm+pt | NA    |      | Perm  | NA    |      | Perm  | NA    |      |
| Protected Phases        | 3     | 1     |       | 3     | 1     |      |       | 2     |      |       | 2     |      |
| Permitted Phases        | 1     |       | 1     | 1     |       |      | 2     |       |      | 2     |       |      |
| Detector Phase          | 3     | 1     | 1     | 3     | 1     |      | 2     | 2     |      | 2     | 2     |      |
| Switch Phase            |       |       |       |       |       |      |       |       |      |       |       |      |
| Minimum Initial (s)     | 6.0   | 6.0   | 6.0   | 6.0   | 6.0   |      | 6.0   | 6.0   |      | 6.0   | 6.0   |      |
| Minimum Split (s)       | 10.0  | 11.0  | 11.0  | 10.0  | 11.0  |      | 11.0  | 11.0  |      | 11.0  | 11.0  |      |
| Total Split (s)         | 14.0  | 35.0  | 35.0  | 14.0  | 35.0  |      | 45.0  | 45.0  |      | 45.0  | 45.0  |      |
| Total Split (%)         | 14.9% | 37.2% | 37.2% | 14.9% | 37.2% |      | 47.9% | 47.9% |      | 47.9% | 47.9% |      |
| Yellow Time (s)         | 3.0   | 3.0   | 3.0   | 3.0   | 3.0   |      | 3.0   | 3.0   |      | 3.0   | 3.0   |      |
| All-Red Time (s)        | 1.0   | 2.0   | 2.0   | 1.0   | 2.0   |      | 2.0   | 2.0   |      | 2.0   | 2.0   |      |
| Lost Time Adjust (s)    | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   |      | 0.0   | 0.0   |      | 0.0   | 0.0   |      |
| Total Lost Time (s)     | 4.0   | 5.0   | 5.0   | 4.0   | 5.0   |      | 5.0   | 5.0   |      | 5.0   | 5.0   |      |
| Lead/Lag                |       | Lead  | Lead  |       | Lead  |      | Lag   | Lag   |      | Lag   | Lag   |      |
| Lead-Lag Optimize?      |       |       |       |       |       |      |       |       |      |       |       |      |
| Recall Mode             | None  | None  | None  | None  | None  |      | None  | None  |      | None  | None  |      |
| Act Effct Green (s)     | 40.1  | 30.0  | 30.0  | 40.1  | 30.0  |      | 38.9  | 38.9  |      | 38.9  | 38.9  |      |
| Actuated g/C Ratio      | 0.44  | 0.33  | 0.33  | 0.44  | 0.33  |      | 0.42  | 0.42  |      | 0.42  | 0.42  |      |
| v/c Ratio               | 0.19  | 0.94  | 0.24  | 0.70  | 1.15  |      | 0.97  | 0.51  |      | 0.47  | 0.09  |      |
| Control Delay           | 15.1  | 56.2  | 12.0  | 32.1  | 116.3 |      | 58.5  | 7.1   |      | 26.5  | 5.0   |      |
| Queue Delay             | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   |      | 0.0   | 0.0   |      | 0.0   | 0.0   |      |
| Total Delay             | 15.1  | 56.2  | 12.0  | 32.1  | 116.3 |      | 58.5  | 7.1   |      | 26.5  | 5.0   |      |
| LOS                     | B     | E     | B     | C     | F     |      | E     | A     |      | C     | A     |      |
| Approach Delay          |       | 45.6  |       |       | 98.8  |      |       | 35.3  |      |       | 19.0  |      |
| Approach LOS            |       | D     |       |       | F     |      |       | D     |      |       | B     |      |
| Queue Length 50th (ft)  | 15    | 335   | 23    | 61    | ~507  |      | 313   | 39    |      | 52    | 1     |      |
| Queue Length 95th (ft)  | 34    | #548  | 67    | #138  | #727  |      | #534  | 116   |      | 109   | 24    |      |
| Internal Link Dist (ft) |       | 717   |       |       | 883   |      |       | 518   |      |       | 548   |      |
| Turn Bay Length (ft)    | 125   |       | 125   | 150   |       |      |       |       |      | 75    |       |      |
| Base Capacity (vph)     | 278   | 614   | 564   | 281   | 614   |      | 589   | 904   |      | 274   | 742   |      |
| Starvation Cap Reductn  | 0     | 0     | 0     | 0     | 0     |      | 0     | 0     |      | 0     | 0     |      |
| Spillback Cap Reductn   | 0     | 0     | 0     | 0     | 0     |      | 0     | 0     |      | 0     | 0     |      |
| Storage Cap Reductn     | 0     | 0     | 0     | 0     | 0     |      | 0     | 0     |      | 0     | 0     |      |
| Reduced v/c Ratio       | 0.18  | 0.94  | 0.24  | 0.66  | 1.15  |      | 0.94  | 0.51  |      | 0.46  | 0.09  |      |

| Intersection Summary                                            |                        |
|-----------------------------------------------------------------|------------------------|
| Area Type:                                                      | Other                  |
| Cycle Length: 94                                                |                        |
| Actuated Cycle Length: 92                                       |                        |
| Natural Cycle: 90                                               |                        |
| Control Type: Actuated-Uncoordinated                            |                        |
| Maximum v/c Ratio: 1.15                                         |                        |
| Intersection Signal Delay: 56.8                                 | Intersection LOS: E    |
| Intersection Capacity Utilization 88.8%                         | ICU Level of Service E |
| Analysis Period (min) 15                                        |                        |
| - Volume exceeds capacity, queue is theoretically infinite.     |                        |
| - Queue shown is maximum after two cycles.                      |                        |
| # 95th percentile volume exceeds capacity, queue may be longer. |                        |
| - Queue shown is maximum after two cycles.                      |                        |

12239.00 :: Needham Street  
19: Wells Avenue/JCC Driveway & Nahanton Street  
2025 Build Conditions without Shuttle Service  
Timing Plan: Weekday Evening



12239.00 :: Needham Street  
20: Highland Avenue & Riverside Street

2025 Build Conditions without Shuttle Service  
Timing Plan: Weekday Evening

| Intersection             |        |       |        |       |      |      |
|--------------------------|--------|-------|--------|-------|------|------|
| Int Delay, s/veh         | 0.3    |       |        |       |      |      |
| Movement                 | NWL    | NWR   | NET    | NER   | SWL  | SWT  |
| Lane Configurations      | ↔      |       | ↔↔     |       |      | ↔    |
| Traffic Vol, veh/h       | 5      | 5     | 965    | 5     | 1    | 1180 |
| Future Vol, veh/h        | 5      | 5     | 965    | 5     | 1    | 1180 |
| Conflicting Peds, #/hr   | 0      | 0     | 0      | 3     | 3    | 0    |
| Sign Control             | Stop   | Stop  | Free   | Free  | Free | Free |
| RT Channelized           | -      | None  | -      | None  | -    | None |
| Storage Length           | 0      | -     | -      | -     | -    | -    |
| Veh in Median Storage, # | 0      | -     | 0      | -     | -    | 0    |
| Grade, %                 | 0      | -     | 0      | -     | -    | 0    |
| Peak Hour Factor         | 92     | 92    | 92     | 92    | 92   | 92   |
| Heavy Vehicles, %        | 0      | 0     | 0      | 0     | 0    | 0    |
| Mvmt Flow                | 5      | 5     | 1049   | 5     | 1    | 1283 |
| Major/Minor              |        |       |        |       |      |      |
| Minor1                   | Major1 |       | Major2 |       |      |      |
| Conflicting Flow All     | 2340   | 530   | 0      | 0     | 1057 | 0    |
| Stage 1                  | 1055   | -     | -      | -     | -    | -    |
| Stage 2                  | 1285   | -     | -      | -     | -    | -    |
| Critical Hdwy            | 6.6    | 6.9   | -      | -     | 4.1  | -    |
| Critical Hdwy Stg 1      | 5.8    | -     | -      | -     | -    | -    |
| Critical Hdwy Stg 2      | 5.4    | -     | -      | -     | -    | -    |
| Follow-up Hdwy           | 3.5    | 3.3   | -      | -     | 2.2  | -    |
| Pot Cap-1 Maneuver       | 36     | 499   | -      | -     | 667  | -    |
| Stage 1                  | 301    | -     | -      | -     | -    | -    |
| Stage 2                  | 262    | -     | -      | -     | -    | -    |
| Platoon blocked, %       |        |       | -      | -     | -    | -    |
| Mov Cap-1 Maneuver       | 36     | 498   | -      | -     | 667  | -    |
| Mov Cap-2 Maneuver       | 36     | -     | -      | -     | -    | -    |
| Stage 1                  | 300    | -     | -      | -     | -    | -    |
| Stage 2                  | 261    | -     | -      | -     | -    | -    |
| Approach                 |        |       |        |       |      |      |
| NW                       | NE     |       | SW     |       |      |      |
| HCM Control Delay, s     | 68.9   | 0     |        | 0     |      |      |
| HCM LOS                  | F      |       |        |       |      |      |
| Minor Lane/Major Mvmt    |        |       |        |       |      |      |
| NET                      | NER    | NWLn1 | SWL    | SWT   |      |      |
| Capacity (veh/h)         | -      | -     | 67     | 667   | -    | -    |
| HCM Lane V/C Ratio       | -      | -     | 0.162  | 0.002 | -    | -    |
| HCM Control Delay (s)    | -      | -     | 68.9   | 10.4  | 0    | -    |
| HCM Lane LOS             | -      | -     | F      | B     | A    | -    |
| HCM 95th %ile Q(veh)     | -      | -     | 0.5    | 0     | -    | -    |

12239.00 :: Needham Street  
21: Highland Avenue & Highland Terrace/Highland Circle

2025 Build Conditions without Shuttle Service  
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| Intersection             |        |      |        |       |        |       |      |      |      |      |      |      |
|--------------------------|--------|------|--------|-------|--------|-------|------|------|------|------|------|------|
| Int Delay, s/veh         | 0.8    |      |        |       |        |       |      |      |      |      |      |      |
| Movement                 | SEL    | SET  | SER    | NWL   | NWT    | NWR   | NEL  | NET  | NER  | SWL  | SWT  | SWR  |
| Lane Configurations      |        | ↔    |        |       | ↔      |       |      | ↔↔   |      |      | ↔↔   |      |
| Traffic Vol, veh/h       | 5      | 0    | 15     | 5     | 0      | 2     | 10   | 965  | 2    | 5    | 1175 | 5    |
| Future Vol, veh/h        | 5      | 0    | 15     | 5     | 0      | 2     | 10   | 965  | 2    | 5    | 1175 | 5    |
| Conflicting Peds, #/hr   | 0      | 0    | 0      | 0     | 0      | 0     | 6    | 0    | 4    | 4    | 0    | 6    |
| Sign Control             | Stop   | Stop | Stop   | Stop  | Stop   | Stop  | Free | Free | Free | Free | Free | Free |
| RT Channelized           | -      | -    | None   | -     | -      | None  | -    | -    | None | -    | -    | None |
| Storage Length           | -      | -    | -      | -     | -      | -     | -    | -    | -    | -    | -    | -    |
| Veh in Median Storage, # | -      | 0    | -      | -     | 0      | -     | -    | 0    | -    | -    | 0    | -    |
| Grade, %                 | -      | 0    | -      | -     | 0      | -     | -    | 0    | -    | -    | 0    | -    |
| Peak Hour Factor         | 92     | 92   | 92     | 92    | 92     | 92    | 92   | 92   | 92   | 92   | 92   | 92   |
| Heavy Vehicles, %        | 0      | 0    | 0      | 0     | 0      | 0     | 0    | 0    | 0    | 0    | 0    | 0    |
| Mvmt Flow                | 5      | 0    | 16     | 5     | 0      | 2     | 11   | 1049 | 2    | 5    | 1277 | 5    |
| Major/Minor              |        |      |        |       |        |       |      |      |      |      |      |      |
| Minor2                   | Minor1 |      | Major1 |       | Major2 |       |      |      |      |      |      |      |
| Conflicting Flow All     | 1843   | 2374 | 647    | 1725  | 2375   | 530   | 1289 | 0    | 0    | 1055 | 0    | 0    |
| Stage 1                  | 1297   | 1297 | -      | 1076  | 1076   | -     | -    | -    | -    | -    | -    | -    |
| Stage 2                  | 546    | 1077 | -      | 649   | 1299   | -     | -    | -    | -    | -    | -    | -    |
| Critical Hdwy            | 7.5    | 6.5  | 6.9    | 7.5   | 6.5    | 6.9   | 4.1  | -    | -    | 4.1  | -    | -    |
| Critical Hdwy Stg 1      | 6.5    | 5.5  | -      | 6.5   | 5.5    | -     | -    | -    | -    | -    | -    | -    |
| Critical Hdwy Stg 2      | 6.5    | 5.5  | -      | 6.5   | 5.5    | -     | -    | -    | -    | -    | -    | -    |
| Follow-up Hdwy           | 3.5    | 4    | 3.3    | 3.5   | 4      | 3.3   | 2.2  | -    | -    | 2.2  | -    | -    |
| Pot Cap-1 Maneuver       | 48     | 35   | 418    | 58    | 35     | 499   | 545  | -    | -    | 668  | -    | -    |
| Stage 1                  | 174    | 234  | -      | 238   | 298    | -     | -    | -    | -    | -    | -    | -    |
| Stage 2                  | 495    | 298  | -      | 430   | 234    | -     | -    | -    | -    | -    | -    | -    |
| Platoon blocked, %       |        |      |        |       |        |       |      | -    | -    | -    | -    | -    |
| Mov Cap-1 Maneuver       | 45     | 32   | 416    | 52    | 32     | 497   | 545  | -    | -    | 668  | -    | -    |
| Mov Cap-2 Maneuver       | 45     | 32   | -      | 52    | 32     | -     | -    | -    | -    | -    | -    | -    |
| Stage 1                  | 165    | 227  | -      | 226   | 282    | -     | -    | -    | -    | -    | -    | -    |
| Stage 2                  | 469    | 282  | -      | 402   | 227    | -     | -    | -    | -    | -    | -    | -    |
| Approach                 |        |      |        |       |        |       |      |      |      |      |      |      |
| SE                       | NW     |      | NE     |       | SW     |       |      |      |      |      |      |      |
| HCM Control Delay, s     | 36.4   |      | 62.6   |       |        | 0.4   |      |      |      | 0.1  |      |      |
| HCM LOS                  | E      |      | F      |       |        |       |      |      |      |      |      |      |
| Minor Lane/Major Mvmt    |        |      |        |       |        |       |      |      |      |      |      |      |
| NEL                      | NET    | NER  | NWLn1  | SELn1 | SWL    | SWT   | SWR  |      |      |      |      |      |
| Capacity (veh/h)         | 545    | -    | -      | 70    | 136    | 668   | -    | -    | -    | -    | -    | -    |
| HCM Lane V/C Ratio       | 0.02   | -    | -      | 0.109 | 0.16   | 0.008 | -    | -    | -    | -    | -    | -    |
| HCM Control Delay (s)    | 11.7   | 0.3  | -      | 62.6  | 36.4   | 10.4  | 0.1  | -    | -    | -    | -    | -    |
| HCM Lane LOS             | B      | A    | -      | F     | E      | B     | A    | -    | -    | -    | -    | -    |
| HCM 95th %ile Q(veh)     | 0.1    | -    | -      | 0.4   | 0.6    | 0     | -    | -    | -    | -    | -    | -    |

2025 Build Conditions without Shuttle Service  
Timing Plan: Weekday Evening

| Intersection Summary                                                                                    |                                                               |
|---------------------------------------------------------------------------------------------------------|---------------------------------------------------------------|
| Area Type:                                                                                              | Other                                                         |
| Cycle Length:                                                                                           | 120                                                           |
| Actuated Cycle Length:                                                                                  | 92.9                                                          |
| Natural Cycle:                                                                                          | 150                                                           |
| Control Type:                                                                                           | Actuated-Uncoordinated                                        |
| Maximum v/c Ratio:                                                                                      | 1.06                                                          |
| Intersection Signal Delay:                                                                              | 43.2                                                          |
| Intersection Capacity Utilization:                                                                      | 88.2%                                                         |
| Analysis Period (min):                                                                                  | 15                                                            |
| ~ Volume exceeds capacity, queue is theoretically infinite.<br>Queue shown is maximum after two cycles. |                                                               |
| #                                                                                                       | 95th percentile volume exceeds capacity, queue may be longer. |
| Queue shown is maximum after two cycles.                                                                |                                                               |

2025 Build Conditions without Shuttle Service  
Timing Plan: Weekday Evening

12239.00 :: Needham Street  
23: Highland Avenue & Charles Street

2025 Build Conditions without Shuttle Service  
Timing Plan: Weekday Evening

| Intersection             |                                                                                   |                                                                                   |                                                                                   |       |                                                                                   |      |
|--------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-------|-----------------------------------------------------------------------------------|------|
| Int Delay, s/veh         | 5.2                                                                               |                                                                                   |                                                                                   |       |                                                                                   |      |
| Movement                 | EBL                                                                               | EBT                                                                               | WBT                                                                               | WBR   | SBL                                                                               | SBR  |
| Lane Configurations      |  |  |  |       |  |      |
| Traffic Vol, veh/h       | 65                                                                                | 835                                                                               | 1325                                                                              | 15    | 20                                                                                | 110  |
| Future Vol, veh/h        | 65                                                                                | 835                                                                               | 1325                                                                              | 15    | 20                                                                                | 110  |
| Conflicting Peds, #/hr   | 4                                                                                 | 0                                                                                 | 0                                                                                 | 4     | 0                                                                                 | 0    |
| Sign Control             | Free                                                                              | Free                                                                              | Free                                                                              | Free  | Stop                                                                              | Stop |
| RT Channelized           | -                                                                                 | None                                                                              | -                                                                                 | None  | -                                                                                 | None |
| Storage Length           | 100                                                                               | -                                                                                 | -                                                                                 | -     | 0                                                                                 | -    |
| Veh in Median Storage, # | -                                                                                 | 0                                                                                 | 0                                                                                 | -     | 0                                                                                 | -    |
| Grade, %                 | -                                                                                 | 0                                                                                 | 0                                                                                 | -     | 0                                                                                 | -    |
| Peak Hour Factor         | 92                                                                                | 92                                                                                | 92                                                                                | 92    | 92                                                                                | 92   |
| Heavy Vehicles, %        | 1                                                                                 | 1                                                                                 | 0                                                                                 | 0     | 0                                                                                 | 0    |
| Mvmt Flow                | 71                                                                                | 908                                                                               | 1440                                                                              | 16    | 22                                                                                | 120  |
| Major/Minor              |                                                                                   |                                                                                   |                                                                                   |       |                                                                                   |      |
| Major1                   | Major2                                                                            |                                                                                   | Minor2                                                                            |       |                                                                                   |      |
| Conflicting Flow All     | 1461                                                                              | 0                                                                                 | -                                                                                 | 0     | 2047                                                                              | 732  |
| Stage 1                  | -                                                                                 | -                                                                                 | -                                                                                 | -     | 1452                                                                              | -    |
| Stage 2                  | -                                                                                 | -                                                                                 | -                                                                                 | -     | 595                                                                               | -    |
| Critical Hdwy            | 4.12                                                                              | -                                                                                 | -                                                                                 | -     | 6.8                                                                               | 6.9  |
| Critical Hdwy Stg 1      | -                                                                                 | -                                                                                 | -                                                                                 | -     | 5.8                                                                               | -    |
| Critical Hdwy Stg 2      | -                                                                                 | -                                                                                 | -                                                                                 | -     | 5.8                                                                               | -    |
| Follow-up Hdwy           | 2.21                                                                              | -                                                                                 | -                                                                                 | -     | 3.5                                                                               | 3.3  |
| Pot Cap-1 Maneuver       | 464                                                                               | -                                                                                 | -                                                                                 | -     | 50                                                                                | 368  |
| Stage 1                  | -                                                                                 | -                                                                                 | -                                                                                 | -     | 185                                                                               | -    |
| Stage 2                  | -                                                                                 | -                                                                                 | -                                                                                 | -     | 519                                                                               | -    |
| Platoon blocked, %       | -                                                                                 | -                                                                                 | -                                                                                 | -     | -                                                                                 | -    |
| Mov Cap-1 Maneuver       | 464                                                                               | -                                                                                 | -                                                                                 | -     | 42                                                                                | 367  |
| Mov Cap-2 Maneuver       | -                                                                                 | -                                                                                 | -                                                                                 | -     | 42                                                                                | -    |
| Stage 1                  | -                                                                                 | -                                                                                 | -                                                                                 | -     | 184                                                                               | -    |
| Stage 2                  | -                                                                                 | -                                                                                 | -                                                                                 | -     | 438                                                                               | -    |
| Approach                 |                                                                                   |                                                                                   |                                                                                   |       |                                                                                   |      |
| EB                       | WB                                                                                |                                                                                   | SB                                                                                |       |                                                                                   |      |
| HCM Control Delay, s     | 1                                                                                 | 0                                                                                 |                                                                                   |       | 87.6                                                                              |      |
| HCM LOS                  |                                                                                   |                                                                                   |                                                                                   |       | F                                                                                 |      |
| Minor Lane/Major Mvmt    |                                                                                   |                                                                                   |                                                                                   |       |                                                                                   |      |
| EBL                      | EBT                                                                               | WBT                                                                               | WBR                                                                               | SBLn1 |                                                                                   |      |
| Capacity (veh/h)         | 464                                                                               | -                                                                                 | -                                                                                 | -     | 168                                                                               |      |
| HCM Lane V/C Ratio       | 0.152                                                                             | -                                                                                 | -                                                                                 | -     | 0.841                                                                             |      |
| HCM Control Delay (s)    | 14.1                                                                              | -                                                                                 | -                                                                                 | -     | 87.6                                                                              |      |
| HCM Lane LOS             | B                                                                                 | -                                                                                 | -                                                                                 | -     | F                                                                                 |      |
| HCM 95th %ile Q(veh)     | 0.5                                                                               | -                                                                                 | -                                                                                 | -     | 5.8                                                                               |      |

12239.00 :: Needham Street  
24: Highland Avenue & Wexford Street

2025 Build Conditions without Shuttle Service  
Timing Plan: Weekday Evening

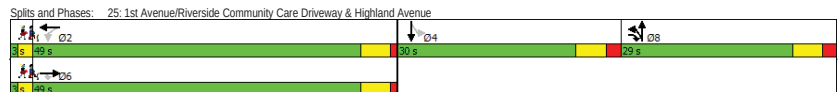
| Intersection             |                                                                                     |                                                                                     |                                                                                     |       |                                                                                     |      |
|--------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------|-------------------------------------------------------------------------------------|------|
| Int Delay, s/veh         | 28.9                                                                                |                                                                                     |                                                                                     |       |                                                                                     |      |
| Movement                 | EBL                                                                                 | EBT                                                                                 | WBT                                                                                 | WBR   | SBL                                                                                 | SBR  |
| Lane Configurations      |  |  |  |       |  |      |
| Traffic Vol, veh/h       | 110                                                                                 | 875                                                                                 | 1325                                                                                | 25    | 25                                                                                  | 205  |
| Future Vol, veh/h        | 110                                                                                 | 875                                                                                 | 1325                                                                                | 25    | 25                                                                                  | 205  |
| Conflicting Peds, #/hr   | 5                                                                                   | 0                                                                                   | 0                                                                                   | 5     | 0                                                                                   | 0    |
| Sign Control             | Free                                                                                | Free                                                                                | Free                                                                                | Free  | Stop                                                                                | Stop |
| RT Channelized           | -                                                                                   | None                                                                                | -                                                                                   | None  | -                                                                                   | None |
| Storage Length           | 100                                                                                 | -                                                                                   | -                                                                                   | -     | 0                                                                                   | -    |
| Veh in Median Storage, # | -                                                                                   | 0                                                                                   | 0                                                                                   | -     | 0                                                                                   | -    |
| Grade, %                 | -                                                                                   | 0                                                                                   | 0                                                                                   | -     | 0                                                                                   | -    |
| Peak Hour Factor         | 92                                                                                  | 92                                                                                  | 92                                                                                  | 92    | 92                                                                                  | 92   |
| Heavy Vehicles, %        | 0                                                                                   | 0                                                                                   | 0                                                                                   | 0     | 0                                                                                   | 0    |
| Mvmt Flow                | 120                                                                                 | 951                                                                                 | 1440                                                                                | 27    | 27                                                                                  | 223  |
| Major/Minor              |                                                                                     |                                                                                     |                                                                                     |       |                                                                                     |      |
| Major1                   | Major2                                                                              |                                                                                     | Minor2                                                                              |       |                                                                                     |      |
| Conflicting Flow All     | 1472                                                                                | 0                                                                                   | -                                                                                   | 0     | 2174                                                                                | 739  |
| Stage 1                  | -                                                                                   | -                                                                                   | -                                                                                   | -     | 1459                                                                                | -    |
| Stage 2                  | -                                                                                   | -                                                                                   | -                                                                                   | -     | 715                                                                                 | -    |
| Critical Hdwy            | 4.1                                                                                 | -                                                                                   | -                                                                                   | -     | 6.8                                                                                 | 6.9  |
| Critical Hdwy Stg 1      | -                                                                                   | -                                                                                   | -                                                                                   | -     | 5.8                                                                                 | -    |
| Critical Hdwy Stg 2      | -                                                                                   | -                                                                                   | -                                                                                   | -     | 5.8                                                                                 | -    |
| Follow-up Hdwy           | 2.2                                                                                 | -                                                                                   | -                                                                                   | -     | 3.5                                                                                 | 3.3  |
| Pot Cap-1 Maneuver       | 464                                                                                 | -                                                                                   | -                                                                                   | -     | 41                                                                                  | 364  |
| Stage 1                  | -                                                                                   | -                                                                                   | -                                                                                   | -     | 183                                                                                 | -    |
| Stage 2                  | -                                                                                   | -                                                                                   | -                                                                                   | -     | 451                                                                                 | -    |
| Platoon blocked, %       | -                                                                                   | -                                                                                   | -                                                                                   | -     | -                                                                                   | -    |
| Mov Cap-1 Maneuver       | 464                                                                                 | -                                                                                   | -                                                                                   | -     | 30                                                                                  | 362  |
| Mov Cap-2 Maneuver       | -                                                                                   | -                                                                                   | -                                                                                   | -     | 30                                                                                  | -    |
| Stage 1                  | -                                                                                   | -                                                                                   | -                                                                                   | -     | 182                                                                                 | -    |
| Stage 2                  | -                                                                                   | -                                                                                   | -                                                                                   | -     | 333                                                                                 | -    |
| Approach                 |                                                                                     |                                                                                     |                                                                                     |       |                                                                                     |      |
| EB                       | WB                                                                                  |                                                                                     | SB                                                                                  |       |                                                                                     |      |
| HCM Control Delay, s     | 1.7                                                                                 | 0                                                                                   |                                                                                     |       | \$ 315.2                                                                            |      |
| HCM LOS                  |                                                                                     |                                                                                     |                                                                                     |       | F                                                                                   |      |
| Minor Lane/Major Mvmt    |                                                                                     |                                                                                     |                                                                                     |       |                                                                                     |      |
| EBL                      | EBT                                                                                 | WBT                                                                                 | WBR                                                                                 | SBLn1 |                                                                                     |      |
| Capacity (veh/h)         | 464                                                                                 | -                                                                                   | -                                                                                   | -     | 164                                                                                 |      |
| HCM Lane V/C Ratio       | 0.258                                                                               | -                                                                                   | -                                                                                   | -     | 1.524                                                                               |      |
| HCM Control Delay (s)    | 15.4                                                                                | -                                                                                   | -                                                                                   | -     | \$ 315.2                                                                            |      |
| HCM Lane LOS             | C                                                                                   | -                                                                                   | -                                                                                   | -     | F                                                                                   |      |
| HCM 95th %ile Q(veh)     | 1                                                                                   | -                                                                                   | -                                                                                   | -     | 16.4                                                                                |      |

Notes  
-: Volume exceeds capacity    \$: Delay exceeds 300s    +: Computation Not Defined    \*: All major volume in platoon

12239.00 :: Needham Street  
25: 1st Avenue/Riverside Community Care Driveway & Highland Avenue  
Timing Plan: Weekday Evening

| Lane Group              | EBL   | EBT   | EBR   | WBL   | WBT   | WBR   | NBL   | NBT   | NBR   | SBL   | SBT  | SBR  | Ø1   | Ø5 |
|-------------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|------|------|------|----|
| Lane Configurations     |       | EBT   | EBR   | WBL   | WBT   | WBR   | NBL   | NBT   | NBR   | SBL   | SBT  | SBR  |      |    |
| Traffic Volume (vph)    | 0     | 950   | 195   | 5     | 1530  | 15    | 485   | 0     | 90    | 0     | 0    | 20   |      |    |
| Future Volume (vph)     | 0     | 950   | 195   | 5     | 1530  | 15    | 485   | 0     | 90    | 0     | 0    | 20   |      |    |
| Ideal Flow (vphpl)      | 1900  | 1900  | 1900  | 1900  | 1900  | 1900  | 1900  | 1900  | 1900  | 1900  | 1900 | 1900 |      |    |
| Storage Length (ft)     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 200   | 0     | 0    | 0    |      |    |
| Storage Lanes           | 0     | 1     | 0     | 0     | 1     | 0     | 1     | 0     | 0     | 0     | 0    | 0    |      |    |
| Taper Length (ft)       | 25    |       | 25    |       | 25    |       | 25    |       | 25    |       | 25   |      |      |    |
| Satd. Flow (prot)       | 0     | 3610  | 1615  | 0     | 3606  | 0     | 1698  | 1637  | 0     | 0     | 1644 | 0    |      |    |
| Flt Permitted           |       |       |       |       | 0.952 |       | 0.950 | 0.967 |       |       |      |      |      |    |
| Satd. Flow (perm)       | 0     | 3610  | 1578  | 0     | 3433  | 0     | 1698  | 1637  | 0     | 0     | 1644 | 0    |      |    |
| Right Turn on Red       |       | Yes   |       |       | Yes   |       | Yes   |       |       |       | Yes  |      |      |    |
| Satd. Flow (RTOR)       |       | 212   |       |       | 1     |       | 98    |       |       |       | 98   |      |      |    |
| Link Speed (mph)        |       | 30    |       |       | 30    |       | 30    |       |       |       | 30   |      |      |    |
| Link Distance (ft)      |       | 377   |       |       | 272   |       | 825   |       |       |       | 147  |      |      |    |
| Travel Time (s)         |       | 8.6   |       |       | 6.2   |       | 18.8  |       |       |       | 3.3  |      |      |    |
| Confl. Peds. (#/hr)     |       |       | 1     | 1     |       |       |       | 2     | 2     |       |      |      |      |    |
| Peak Hour Factor        | 0.92  | 0.92  | 0.92  | 0.92  | 0.92  | 0.92  | 0.92  | 0.92  | 0.92  | 0.92  | 0.92 | 0.92 |      |    |
| Heavy Vehicles (%)      | 0%    | 0%    | 0%    | 0%    | 0%    | 0%    | 1%    | 1%    | 0%    | 0%    | 0%   | 0%   |      |    |
| Shared Lane Traffic (%) |       |       |       |       |       |       | 40%   |       |       |       |      |      |      |    |
| Lane Group Flow (vph)   | 0     | 1033  | 212   | 0     | 1684  | 0     | 316   | 309   | 0     | 0     | 22   | 0    |      |    |
| Turn Type               |       | NA    | pm+ov | Perm  | NA    |       | Split | NA    |       |       | NA   |      |      |    |
| Protected Phases        |       | 6     | 8     |       | 2     |       | 8     | 8     |       |       | 4    |      | 1    | 5  |
| Permitted Phases        |       | 6     |       | 2     |       |       |       |       |       | 4     |      |      |      |    |
| Detector Phase          |       | 6     | 8     | 2     | 2     |       | 8     | 8     |       | 4     | 4    |      |      |    |
| Switch Phase            |       |       |       |       |       |       |       |       |       |       |      |      |      |    |
| Minimum Initial (s)     | 10.0  | 6.0   | 10.0  | 10.0  |       | 6.0   | 6.0   |       | 6.0   | 6.0   |      | 1.0  | 1.0  |    |
| Minimum Split (s)       | 25.0  | 12.0  | 16.0  | 16.0  |       | 12.0  | 12.0  |       | 29.0  | 29.0  |      | 3.0  | 3.0  |    |
| Total Split (s)         | 49.0  | 29.0  | 49.0  | 49.0  |       | 29.0  | 29.0  |       | 30.0  | 30.0  |      | 3.0  | 3.0  |    |
| Total Split (%)         | 44.1% | 26.1% | 44.1% | 44.1% |       | 26.1% | 26.1% |       | 27.0% | 27.0% |      | 3%   | 3%   |    |
| Yellow Time (s)         | 4.0   | 4.0   | 4.0   | 4.0   |       | 4.0   | 4.0   |       | 4.0   | 4.0   |      | 2.0  | 2.0  |    |
| All-Red Time (s)        | 1.0   | 2.0   | 1.0   | 1.0   |       | 2.0   | 2.0   |       | 2.0   | 2.0   |      | 0.0  | 0.0  |    |
| Last Time Adjust (s)    | 0.0   | 0.0   | 0.0   | 0.0   |       | 0.0   | 0.0   |       | 0.0   | 0.0   |      | 0.0  | 0.0  |    |
| Total Lost Time (s)     | 5.0   | 6.0   |       | 5.0   |       | 6.0   | 6.0   |       |       | 6.0   |      |      |      |    |
| Lead/Lag                | Lag   |       | Lag   | Lag   |       |       |       |       |       |       |      | Lead | Lead |    |
| Lead-Lag Optimize?      | Yes   |       | Yes   | Yes   |       |       |       |       |       |       |      | Yes  | Yes  |    |
| Recall Mode             | Min   | None  | Min   | Min   |       | None  | None  |       | None  | None  |      | None | None |    |
| Act Effct Green (s)     | 45.2  | 64.7  |       | 45.7  |       | 20.5  | 20.5  |       |       | 8.8   |      |      |      |    |
| Actuated g/C Ratio      | 0.54  | 0.77  |       | 0.54  |       | 0.24  | 0.24  |       |       | 0.10  |      |      |      |    |
| v/c Ratio               | 0.53  | 0.17  |       | 0.90  |       | 0.76  | 0.65  |       |       | 0.08  |      |      |      |    |
| Control Delay           | 16.9  | 1.0   |       | 28.8  |       | 45.1  | 28.4  |       |       | 0.7   |      |      |      |    |
| Queue Delay             | 0.0   | 0.0   |       | 0.0   |       | 0.0   | 0.0   |       |       | 0.0   |      |      |      |    |
| Total Delay             | 16.9  | 1.0   |       | 28.8  |       | 45.1  | 28.4  |       |       | 0.7   |      |      |      |    |
| LOS                     | B     | A     |       | C     |       | D     | C     |       |       | A     |      |      |      |    |
| Approach Delay          | 14.2  |       |       | 28.8  |       |       | 36.8  |       |       | 0.7   |      |      |      |    |
| Approach LOS            | B     |       |       | C     |       |       | D     |       |       | A     |      |      |      |    |
| Queue Length 50th (ft)  | 145   | 0     |       | 333   |       | 138   | 87    |       |       | 0     |      |      |      |    |
| Queue Length 95th (ft)  | 395   | 22    |       | #681  |       | #398  | #265  |       |       | 0     |      |      |      |    |
| Internal Link Dist (ft) | 297   |       |       | 192   |       |       | 745   |       |       | 67    |      |      |      |    |
| Turn Bay Length (ft)    |       |       |       |       |       |       |       |       |       |       |      |      |      |    |
| Base Capacity (vph)     | 1938  | 1312  |       | 1862  |       | 476   | 530   |       |       | 550   |      |      |      |    |
| Starvation Cap Reductn  | 0     | 0     |       | 0     |       | 0     | 0     |       |       | 0     |      |      |      |    |
| Spillback Cap Reductn   | 0     | 0     |       | 0     |       | 0     | 0     |       |       | 0     |      |      |      |    |
| Storage Cap Reductn     | 0     | 0     |       | 0     |       | 0     | 0     |       |       | 0     |      |      |      |    |
| Reduced v/c Ratio       | 0.53  | 0.16  |       | 0.90  |       | 0.66  | 0.58  |       |       | 0.04  |      |      |      |    |

| Intersection Summary                                            |                        |
|-----------------------------------------------------------------|------------------------|
| Area Type:                                                      | Other                  |
| Cycle Length: 111                                               |                        |
| Actuated Cycle Length: 84.2                                     |                        |
| Natural Cycle: 130                                              |                        |
| Control Type: Actuated-Uncoordinated                            |                        |
| Maximum v/c Ratio: 0.90                                         |                        |
| Intersection Signal Delay: 24.9                                 | Intersection LOS: C    |
| Intersection Capacity Utilization 78.3%                         | ICU Level of Service D |
| Analysis Period (min) 15                                        |                        |
| # 95th percentile volume exceeds capacity, queue may be longer. |                        |
| Queue shown is maximum after two cycles.                        |                        |



12239.00 :: Needham Street  
26: I-95 NB Ramps & Highland Avenue  
Timing Plan: Weekday Evening

| Intersection             |        |      |        |      |      |        |      |      |        |      |      |       |
|--------------------------|--------|------|--------|------|------|--------|------|------|--------|------|------|-------|
| Int Delay, s/veh         | 1.4    |      |        |      |      |        |      |      |        |      |      |       |
| Movement                 | EBL    | EBT  | EBR    | WBL  | WBT  | WBR    | NBL  | NBT  | NBR    | SBL  | SBT  | SBR   |
| Lane Configurations      |        | ↕↕   | ↕      |      | ↕↕   |        |      |      | ↕      |      |      | ↕     |
| Traffic Vol, veh/h       | 0      | 940  | 455    | 0    | 1070 | 965    | 0    | 0    | 205    | 0    | 0    | 110   |
| Future Vol, veh/h        | 0      | 940  | 455    | 0    | 1070 | 965    | 0    | 0    | 205    | 0    | 0    | 110   |
| Conflicting Peds, #/hr   | 3      | 0    | 0      | 0    | 0    | 3      | 0    | 0    | 0      | 0    | 0    | 3     |
| Sign Control             | Free   | Free | Free   | Free | Free | Free   | Stop | Stop | Stop   | Stop | Stop | Stop  |
| RT Channelized           | -      | -    | Yield  | -    | -    | Yield  | -    | -    | Yield  | -    | -    | Yield |
| Storage Length           | -      | -    | 0      | -    | -    | -      | -    | -    | 0      | -    | -    | 0     |
| Veh in Median Storage, # | -      | 0    | -      | -    | 0    | -      | -    | 0    | -      | -    | 0    | -     |
| Grade, %                 | -      | 0    | -      | -    | 0    | -      | -    | 0    | -      | -    | 0    | -     |
| Peak Hour Factor         | 92     | 92   | 92     | 92   | 92   | 92     | 92   | 92   | 92     | 92   | 92   | 92    |
| Heavy Vehicles, %        | 1      | 1    | 1      | 1    | 1    | 1      | 2    | 2    | 2      | 2    | 2    | 2     |
| Mvmt Flow                | 0      | 1022 | 495    | 0    | 1163 | 1049   | 0    | 0    | 223    | 0    | 0    | 120   |
| Major/Minor              |        |      |        |      |      |        |      |      |        |      |      |       |
|                          | Major1 |      | Major2 |      |      | Minor1 |      |      | Minor2 |      |      |       |
| Conflicting Flow All     | -      | 0    | 0      | -    | -    | 0      | -    | -    | 511    | -    | -    | 588   |
| Stage 1                  | -      | -    | -      | -    | -    | -      | -    | -    | -      | -    | -    | -     |
| Stage 2                  | -      | -    | -      | -    | -    | -      | -    | -    | -      | -    | -    | -     |
| Critical Hdwy            | -      | -    | -      | -    | -    | -      | -    | -    | 6.94   | -    | -    | 6.94  |
| Critical Hdwy Stg 1      | -      | -    | -      | -    | -    | -      | -    | -    | -      | -    | -    | -     |
| Critical Hdwy Stg 2      | -      | -    | -      | -    | -    | -      | -    | -    | -      | -    | -    | -     |
| Follow-up Hdwy           | -      | -    | -      | -    | -    | -      | -    | -    | 3.32   | -    | -    | 3.32  |
| Pot Cap-1 Maneuver       | 0      | -    | 0      | -    | -    | 0      | 0    | 508  | 0      | 0    | 452  |       |
| Stage 1                  | 0      | -    | 0      | -    | -    | 0      | 0    | -    | 0      | 0    | -    |       |
| Stage 2                  | 0      | -    | 0      | -    | -    | 0      | 0    | -    | 0      | 0    | -    |       |
| Platoon blocked, %       | -      | -    | -      | -    | -    | -      | -    | -    | -      | -    | -    | -     |
| Mov Cap-1 Maneuver       | -      | -    | -      | -    | -    | -      | -    | 508  | -      | -    | 450  |       |
| Mov Cap-2 Maneuver       | -      | -    | -      | -    | -    | -      | -    | -    | -      | -    | -    |       |
| Stage 1                  | -      | -    | -      | -    | -    | -      | -    | -    | -      | -    | -    |       |
| Stage 2                  | -      | -    | -      | -    | -    | -      | -    | -    | -      | -    | -    |       |
| Approach                 |        |      |        |      |      |        |      |      |        |      |      |       |
|                          | EB     |      | WB     |      |      | NB     |      |      | SB     |      |      |       |
| HCM Control Delay, s     | 0      |      | 0      |      |      | 17.5   |      |      | 15.9   |      |      |       |
| HCM LOS                  |        |      |        |      |      | C      |      |      | C      |      |      |       |
| Minor Lane/Major Mvmt    |        |      |        |      |      |        |      |      |        |      |      |       |
|                          | NBLn1  | EBT  | EBR    | WBT  | WBR  | SBLn1  |      |      |        |      |      |       |
| Capacity (veh/h)         | 508    | -    | -      | -    | -    | 450    |      |      |        |      |      |       |
| HCM Lane V/C Ratio       | 0.439  | -    | -      | -    | -    | 0.266  |      |      |        |      |      |       |
| HCM Control Delay (s)    | 17.5   | -    | -      | -    | -    | 15.9   |      |      |        |      |      |       |
| HCM Lane LOS             | C      | -    | -      | -    | -    | C      |      |      |        |      |      |       |
| HCM 95th %ile Q(veh)     | 2.2    | -    | -      | -    | -    | 1.1    |      |      |        |      |      |       |

12239.00 :: Needham Street  
27: I-95 SB Ramps & Highland Avenue

2025 Build Conditions without Shuttle Service  
Timing Plan: Weekday Evening

| Intersection             |        |      |       |        |      |       |        |      |       |        |      |       |
|--------------------------|--------|------|-------|--------|------|-------|--------|------|-------|--------|------|-------|
| Int Delay, s/veh         | 9.1    |      |       |        |      |       |        |      |       |        |      |       |
| Movement                 | EBL    | EBT  | EBR   | WBL    | WBT  | WBR   | NBL    | NBT  | NBR   | SBL    | SBT  | SBR   |
| Lane Configurations      |        | ↕↕   |       |        | ↕↕   | ↕     |        |      | ↕     |        |      | ↕     |
| Traffic Vol, veh/h       | 0      | 1005 | 260   | 0      | 750  | 430   | 0      | 0    | 390   | 0      | 0    | 415   |
| Future Vol, veh/h        | 0      | 1005 | 260   | 0      | 750  | 430   | 0      | 0    | 390   | 0      | 0    | 415   |
| Conflicting Peds, #/hr   | 3      | 0    | 0     | 0      | 0    | 3     | 0      | 0    | 0     | 0      | 0    | 3     |
| Sign Control             | Free   | Free | Free  | Free   | Free | Free  | Stop   | Stop | Stop  | Stop   | Stop | Stop  |
| RT Channelized           | -      | -    | Yield | -      | -    | Yield | -      | -    | Yield | -      | -    | Yield |
| Storage Length           | -      | -    | -     | -      | -    | 0     | -      | -    | 0     | -      | -    | 0     |
| Veh in Median Storage, # | -      | 0    | -     | -      | 0    | -     | -      | 0    | -     | -      | 0    | -     |
| Grade, %                 | -      | 0    | -     | -      | 0    | -     | -      | 0    | -     | -      | 0    | -     |
| Peak Hour Factor         | 92     | 92   | 92    | 92     | 92   | 92    | 92     | 92   | 92    | 92     | 92   | 92    |
| Heavy Vehicles, %        | 1      | 1    | 1     | 1      | 1    | 1     | 2      | 2    | 2     | 0      | 0    | 0     |
| Mvmt Flow                | 0      | 1092 | 283   | 0      | 815  | 467   | 0      | 0    | 424   | 0      | 0    | 451   |
| Major/Minor              | Major1 |      |       | Major2 |      |       | Minor1 |      |       | Minor2 |      |       |
| Conflicting Flow All     | -      | 0    | 0     | -      | -    | 0     | -      | -    | 546   | -      | -    | 414   |
| Stage 1                  | -      | -    | -     | -      | -    | -     | -      | -    | -     | -      | -    | -     |
| Stage 2                  | -      | -    | -     | -      | -    | -     | -      | -    | -     | -      | -    | -     |
| Critical Hdwy            | -      | -    | -     | -      | -    | -     | -      | -    | 6.94  | -      | -    | 6.9   |
| Critical Hdwy Stg 1      | -      | -    | -     | -      | -    | -     | -      | -    | -     | -      | -    | -     |
| Critical Hdwy Stg 2      | -      | -    | -     | -      | -    | -     | -      | -    | -     | -      | -    | -     |
| Follow-up Hdwy           | -      | -    | -     | -      | -    | -     | -      | -    | 3.32  | -      | -    | 3.3   |
| Pot Cap-1 Maneuver       | 0      | -    | -     | 0      | -    | -     | 0      | 0    | 482   | 0      | 0    | 593   |
| Stage 1                  | 0      | -    | -     | 0      | -    | -     | 0      | 0    | -     | 0      | 0    | -     |
| Stage 2                  | 0      | -    | -     | 0      | -    | -     | 0      | 0    | -     | 0      | 0    | -     |
| Platoon blocked, %       | -      | -    | -     | -      | -    | -     | -      | -    | -     | -      | -    | -     |
| Mov Cap-1 Maneuver       | -      | -    | -     | -      | -    | -     | -      | -    | 482   | -      | -    | 590   |
| Mov Cap-2 Maneuver       | -      | -    | -     | -      | -    | -     | -      | -    | -     | -      | -    | -     |
| Stage 1                  | -      | -    | -     | -      | -    | -     | -      | -    | -     | -      | -    | -     |
| Stage 2                  | -      | -    | -     | -      | -    | -     | -      | -    | -     | -      | -    | -     |
| Approach                 | EB     |      |       | WB     |      |       | NB     |      |       | SB     |      |       |
| HCM Control Delay, s     | 0      |      |       | 0      |      |       | 46.1   |      |       | 28.2   |      |       |
| HCM LOS                  |        |      |       |        |      |       | E      |      |       | D      |      |       |
| Minor Lane/Major Mvmt    | NBLn1  | EBT  | EBR   | WBT    | WBR  | SBLn1 |        |      |       |        |      |       |
| Capacity (veh/h)         | 482    | -    | -     | -      | -    | 590   |        |      |       |        |      |       |
| HCM Lane V/C Ratio       | 0.879  | -    | -     | -      | -    | 0.765 |        |      |       |        |      |       |
| HCM Control Delay (s)    | 46.1   | -    | -     | -      | -    | 28.2  |        |      |       |        |      |       |
| HCM Lane LOS             | E      | -    | -     | -      | -    | D     |        |      |       |        |      |       |
| HCM 95th %tile Q(veh)    | 9.5    | -    | -     | -      | -    | 7     |        |      |       |        |      |       |

12239.00 :: Needham Street  
1: Chestnut Street & Route 9 WB Access Road

2025 Build Conditions without Shuttle Service  
Timing Plan: Saturday Midday

| Intersection               |       |       |       |       |      |      |      |      |      |      |      |      |
|----------------------------|-------|-------|-------|-------|------|------|------|------|------|------|------|------|
| Intersection Delay, s/veh  | 28.7  |       |       |       |      |      |      |      |      |      |      |      |
| Intersection LOS           | D     |       |       |       |      |      |      |      |      |      |      |      |
| Movement                   | EBL   | EBT   | EBR   | WBL   | WBT  | WBR  | NBL  | NBT  | NBR  | SBL  | SBT  | SBR  |
| Lane Configurations        |       | ↕     |       |       | ↕    |      |      | ↕    |      | ↕    |      |      |
| Traffic Vol, veh/h         | 2     | 0     | 1     | 70    | 25   | 35   | 70   | 445  | 1    | 1    | 430  | 155  |
| Future Vol, veh/h          | 2     | 0     | 1     | 70    | 25   | 35   | 70   | 445  | 1    | 1    | 430  | 155  |
| Peak Hour Factor           | 0.92  | 0.92  | 0.92  | 0.92  | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Heavy Vehicles, %          | 0     | 0     | 0     | 0     | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    |
| Mvmt Flow                  | 2     | 0     | 1     | 76    | 27   | 38   | 76   | 484  | 1    | 1    | 467  | 168  |
| Number of Lanes            | 0     | 1     | 0     | 0     | 1    | 0    | 0    | 1    | 0    | 0    | 1    | 0    |
| Approach                   | EB    |       |       | WB    |      |      | NB   |      |      | SB   |      |      |
| Opposing Approach          | WB    |       |       | EB    |      |      | SB   |      |      | NB   |      |      |
| Opposing Lanes             | 1     |       |       | 1     |      |      | 1    |      |      | 1    |      |      |
| Conflicting Approach Left  | SB    |       |       | NB    |      |      | EB   |      |      | WB   |      |      |
| Conflicting Lanes Left     | 1     |       |       | 1     |      |      | 1    |      |      | 1    |      |      |
| Conflicting Approach Right | NB    |       |       | SB    |      |      | WB   |      |      | EB   |      |      |
| Conflicting Lanes Right    | 1     |       |       | 1     |      |      | 1    |      |      | 1    |      |      |
| HCM Control Delay          | 10.3  |       |       | 12    |      |      | 27.4 |      |      | 33.7 |      |      |
| HCM LOS                    | B     |       |       | B     |      |      | D    |      |      | D    |      |      |
| Lane                       | NBLn1 | EBLn1 | WBLn1 | SBLn1 |      |      |      |      |      |      |      |      |
| Vol Left, %                | 14%   | 67%   | 54%   | 0%    |      |      |      |      |      |      |      |      |
| Vol Thru, %                | 86%   | 0%    | 19%   | 73%   |      |      |      |      |      |      |      |      |
| Vol Right, %               | 0%    | 33%   | 27%   | 26%   |      |      |      |      |      |      |      |      |
| Sign Control               | Stop  | Stop  | Stop  | Stop  |      |      |      |      |      |      |      |      |
| Traffic Vol by Lane        | 516   | 3     | 130   | 586   |      |      |      |      |      |      |      |      |
| LT Vol                     | 70    | 2     | 70    | 1     |      |      |      |      |      |      |      |      |
| Through Vol                | 445   | 0     | 25    | 430   |      |      |      |      |      |      |      |      |
| RT Vol                     | 1     | 1     | 35    | 155   |      |      |      |      |      |      |      |      |
| Lane Flow Rate             | 561   | 3     | 141   | 637   |      |      |      |      |      |      |      |      |
| Geometry Grp               | 1     | 1     | 1     | 1     |      |      |      |      |      |      |      |      |
| Degree of Util (X)         | 0.817 | 0.006 | 0.26  | 0.884 |      |      |      |      |      |      |      |      |
| Departure Headway (Hd)     | 5.247 | 7.165 | 6.634 | 4.998 |      |      |      |      |      |      |      |      |
| Convergence, Y/N           | Yes   | Yes   | Yes   | Yes   |      |      |      |      |      |      |      |      |
| Cap                        | 690   | 496   | 540   | 726   |      |      |      |      |      |      |      |      |
| Service Time               | 3.287 | 5.256 | 4.694 | 3.036 |      |      |      |      |      |      |      |      |
| HCM Lane V/C Ratio         | 0.813 | 0.006 | 0.261 | 0.877 |      |      |      |      |      |      |      |      |
| HCM Control Delay          | 27.4  | 10.3  | 12    | 33.7  |      |      |      |      |      |      |      |      |
| HCM Lane LOS               | D     | B     | B     | D     |      |      |      |      |      |      |      |      |
| HCM 95th-ile Q             | 8.6   | 0     | 1     | 11.1  |      |      |      |      |      |      |      |      |

2025 Build Conditions without Shuttle Service  
Timing Plan: Saturday Midday

| Lane                   | NBLn1 | EBLn1 | WBLn1 | SBLn1 |
|------------------------|-------|-------|-------|-------|
| Vol Left, %            | 0%    | 41%   | 0%    | 21%   |
| Vol Thru, %            | 89%   | 46%   | 9%    | 79%   |
| Vol Right, %           | 11%   | 13%   | 91%   | 0%    |
| Sign Control           | Stop  | Stop  | Stop  | Stop  |
| Traffic Vol by Lane    | 435   | 270   | 22    | 502   |
| LT Vol                 | 0     | 110   | 0     | 105   |
| Through Vol            | 385   | 125   | 2     | 395   |
| RT Vol                 | 50    | 35    | 20    | 2     |
| Lane Flow Rate         | 473   | 293   | 24    | 546   |
| Geometry Grp           | 1     | 1     | 1     | 1     |
| Degree of Util (X)     | 0.782 | 0.552 | 0.048 | 0.899 |
| Departure Headway (Hd) | 5.953 | 6.774 | 7.297 | 5.934 |
| Convergence, Y/N       | Yes   | Yes   | Yes   | Yes   |
| Cap                    | 610   | 531   | 488   | 611   |
| Service Time           | 3.994 | 4.821 | 5.38  | 3.974 |
| HCM Lane V/C Ratio     | 0.775 | 0.552 | 0.049 | 0.894 |
| HCM Control Delay      | 27.1  | 17.9  | 10.8  | 40.4  |
| HCM Lane LOS           | D     | C     | B     | E     |
| HCM 95th-ile Q         | 7.4   | 3.3   | 0.2   | 10.9  |

HCM 2010 AWSC  
VHB/MSD

12239.00 :: Needham Street 2025 Build Conditions without Shuttle Service  
 3: Chestnut Street & Elliot Street Timing Plan: Saturday Midday

| Lane Group              | EBL   | EBT   | EBR  | WBL   | WBT   | WBR  | NBL   | NBT   | NBR  | SBL   | SBT   | SBR  | Ø3   |
|-------------------------|-------|-------|------|-------|-------|------|-------|-------|------|-------|-------|------|------|
| Lane Configurations     |       | ↕     |      |       | ↕     |      |       | ↕     |      |       | ↕     |      |      |
| Traffic Volume (vph)    | 185   | 155   | 45   | 5     | 125   | 65   | 80    | 255   | 10   | 55    | 335   | 195  |      |
| Future Volume (vph)     | 185   | 155   | 45   | 5     | 125   | 65   | 80    | 255   | 10   | 55    | 335   | 195  |      |
| Ideal Flow (vphpl)      | 1900  | 1900  | 1900 | 1900  | 1900  | 1900 | 1900  | 1900  | 1900 | 1900  | 1900  | 1900 |      |
| Satd. Flow (prot)       | 0     | 1821  | 0    | 0     | 1775  | 0    | 0     | 1870  | 0    | 0     | 1787  | 0    |      |
| Flt Permitted           |       | 0.719 |      |       | 0.91  |      |       | 0.669 |      |       | 0.934 |      |      |
| Satd. Flow (perm)       | 0     | 1336  | 0    | 0     | 1761  | 0    | 0     | 1264  | 0    | 0     | 1678  | 0    |      |
| Right Turn on Red       |       |       | Yes  |       |       | Yes  |       |       | Yes  |       |       | Yes  |      |
| Satd. Flow (RTOR)       |       | 8     |      |       | 31    |      |       | 2     |      |       | 31    |      |      |
| Link Speed (mph)        |       | 30    |      |       | 30    |      |       | 30    |      |       | 30    |      |      |
| Link Distance (ft)      |       | 764   |      |       | 972   |      |       | 2055  |      |       | 1553  |      |      |
| Travel Time (s)         |       | 17.4  |      |       | 22.1  |      |       | 46.7  |      |       | 35.3  |      |      |
| Confl. Peds. (#/hr)     | 6     |       | 4    | 4     |       |      | 6     |       | 2    | 2     |       | 6    |      |
| Confl. Bikes (#/hr)     |       |       |      |       |       | 4    |       |       | 2    |       |       | 1    |      |
| Peak Hour Factor        | 0.92  | 0.92  | 0.92 | 0.92  | 0.92  | 0.92 | 0.92  | 0.92  | 0.92 | 0.92  | 0.92  | 0.92 |      |
| Heavy Vehicles (%)      | 0%    | 0%    | 0%   | 1%    | 1%    | 1%   | 0%    | 0%    | 0%   | 0%    | 0%    | 0%   |      |
| Shared Lane Traffic (%) |       |       |      |       |       |      |       |       |      |       |       |      |      |
| Lane Group Flow (vph)   | 0     | 418   | 0    | 0     | 212   | 0    | 0     | 375   | 0    | 0     | 636   | 0    |      |
| Turn Type               | Perm  | NA    |      | Perm  | NA    |      | Perm  | NA    |      | Perm  | NA    |      |      |
| Protected Phases        |       | 1     |      |       | 1     |      |       | 2     |      |       | 2     |      | 3    |
| Permitted Phases        | 1     |       |      | 1     |       |      | 2     |       |      | 2     |       |      |      |
| Detector Phase          | 1     | 1     |      | 1     | 1     |      | 2     | 2     |      | 2     | 2     |      |      |
| Switch Phase            |       |       |      |       |       |      |       |       |      |       |       |      |      |
| Minimum Initial (s)     | 6.0   | 6.0   |      | 6.0   | 6.0   |      | 6.0   | 6.0   |      | 6.0   | 6.0   |      | 4.0  |
| Minimum Split (s)       | 11.0  | 11.0  |      | 11.0  | 11.0  |      | 11.0  | 11.0  |      | 11.0  | 11.0  |      | 19.0 |
| Total Split (s)         | 35.0  | 35.0  |      | 35.0  | 35.0  |      | 35.0  | 35.0  |      | 35.0  | 35.0  |      | 19.0 |
| Total Split (%)         | 39.3% | 39.3% |      | 39.3% | 39.3% |      | 39.3% | 39.3% |      | 39.3% | 39.3% |      | 21%  |
| Yellow Time (s)         | 3.0   | 3.0   |      | 3.0   | 3.0   |      | 3.0   | 3.0   |      | 3.0   | 3.0   |      | 3.0  |
| All-Red Time (s)        | 2.0   | 2.0   |      | 2.0   | 2.0   |      | 2.0   | 2.0   |      | 2.0   | 2.0   |      | 1.0  |
| Lost Time Adjust (s)    |       | 0.0   |      |       | 0.0   |      |       | 0.0   |      |       | 0.0   |      |      |
| Total Lost Time (s)     |       | 5.0   |      |       | 5.0   |      |       | 5.0   |      |       | 5.0   |      |      |
| Lead/Lag                | Lead  | Lead  |      | Lead  | Lead  |      | Lag   | Lag   |      | Lag   | Lag   |      |      |
| Lead-Lag Optimize?      |       |       |      |       |       |      |       |       |      |       |       |      |      |
| Recall Mode             | None  | None  |      | None  | None  |      | None  | None  |      | None  | None  |      | None |
| Act Effct Green (s)     |       | 28.3  |      |       | 28.3  |      |       | 30.7  |      |       | 30.7  |      |      |
| Actuated g/C Ratio      |       | 0.37  |      |       | 0.37  |      |       | 0.41  |      |       | 0.41  |      |      |
| v/c Ratio               |       | 0.83  |      |       | 0.81  |      |       | 0.73  |      |       | 0.91  |      |      |
| Control Delay           |       | 39.5  |      |       | 17.4  |      |       | 33.0  |      |       | 43.4  |      |      |
| Queue Delay             |       | 0.0   |      |       | 0.0   |      |       | 0.0   |      |       | 0.0   |      |      |
| Total Delay             |       | 39.5  |      |       | 17.4  |      |       | 33.0  |      |       | 43.4  |      |      |
| LOS                     |       | D     |      |       | B     |      |       | C     |      |       | D     |      |      |
| Approach Delay          |       | 39.5  |      |       | 17.4  |      |       | 33.0  |      |       | 43.4  |      |      |
| Approach LOS            |       | D     |      |       | B     |      |       | C     |      |       | D     |      |      |
| Queue Length 50th (ft)  |       | 140   |      |       | 48    |      |       | 125   |      |       | 228   |      |      |
| Queue Length 95th (ft)  |       | #403  |      |       | 133   |      |       | #364  |      |       | #604  |      |      |
| Internal Link Dist (ft) |       | 684   |      |       | 892   |      |       | 1975  |      |       | 1973  |      |      |
| Turn Bay Length (ft)    |       |       |      |       |       |      |       |       |      |       |       |      |      |
| Base Capacity (vph)     |       | 546   |      |       | 732   |      |       | 513   |      |       | 698   |      |      |
| Starvation Cap Reductn  |       | 0     |      |       | 0     |      |       | 0     |      |       | 0     |      |      |
| Spillback Cap Reductn   |       | 0     |      |       | 0     |      |       | 0     |      |       | 0     |      |      |
| Storage Cap Reductn     |       | 0     |      |       | 0     |      |       | 0     |      |       | 0     |      |      |
| Reduced v/c Ratio       |       | 0.77  |      |       | 0.29  |      |       | 0.73  |      |       | 0.91  |      |      |

### Intersection Summary

|            |       |
|------------|-------|
| Area Type: | Other |
|------------|-------|

Cycle Length: 89

Actuated Cycle Length: 75.7

Natural Cycle: 90

Control Type: Actuated-Uncoordinated

Maximum v/c Ratio: 0.91

Intersection Signal Delay: 36.7

Intersection Capacity Utilization 81.0%

Analysis Period (min) 15

# 95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

Splits and Phases: 3: Chestnut Street & Elliot Street



Lanes, Volumes, Timings  
VHB/MSD

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07/03/2018



12239.00 :: Needham Street  
4: Oak Street & Chestnut Street

2025 Build Conditions without Shuttle Service  
Timing Plan: Saturday Midday

| Lane Group              | EBL       | EBT       | EBR       | WBL       | WBT       | WBR       | NBL       | NBT       | NBR       | SBL       | SBT       | SBR       | Ø3 |
|-------------------------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|----|
| Lane Configurations     | ↔         |           | ↔         | ↔         |           | ↔         | ↔         |           | ↔         | ↔         | ↔         | ↔         |    |
| Traffic Volume (vph)    | 20        | 10        | 405       | 20        | 10        | 2         | 300       | 85        | 25        | 5         | 115       | 20        |    |
| Future Volume (vph)     | 20        | 10        | 405       | 20        | 10        | 2         | 300       | 85        | 25        | 5         | 115       | 20        |    |
| Ideal Flow (vphpl)      | 1900      | 1900      | 1900      | 1900      | 1900      | 1900      | 1900      | 1900      | 1900      | 1900      | 1900      | 1900      |    |
| Satd. Flow (prot)       | 0         | 1619      | 0         | 0         | 1826      | 0         | 0         | 1815      | 0         | 0         | 1814      | 0         |    |
| Flt Permitted           | 0.984     |           |           | 0.461     |           |           |           | 0.689     |           |           | 0.987     |           |    |
| Satd. Flow (perm)       | 0         | 1596      | 0         | 0         | 867       | 0         | 0         | 1290      | 0         | 0         | 1794      | 0         |    |
| Right Turn on Red       | Yes       |           | Yes       |           | Yes       |           | Yes       |           | Yes       |           | Yes       |           |    |
| Satd. Flow (RTOR)       | 440       |           | 2         |           | 4         |           | 9         |           | 30        |           | 762       |           |    |
| Link Speed (mph)        | 30        |           | 30        |           | 30        |           | 30        |           | 30        |           | 30        |           |    |
| Link Distance (ft)      | 2055      |           | 492       |           | 226       |           | 762       |           | 17.3      |           | 17.3      |           |    |
| Travel Time (s)         | 46.7      |           | 11.2      |           | 5.1       |           | 17.3      |           | 17.3      |           | 17.3      |           |    |
| Confl. Peds. (#/hr)     | 1         |           | 3         | 3         |           | 1         | 5         |           | 7         | 7         |           | 5         |    |
| Confl. Bikes (#/hr)     |           |           |           |           |           | 2         |           |           |           |           |           |           |    |
| Peak Hour Factor        | 0.92      | 0.92      | 0.92      | 0.92      | 0.92      | 0.92      | 0.92      | 0.92      | 0.92      | 0.92      | 0.92      | 0.92      |    |
| Heavy Vehicles (%)      | 0%        | 0%        | 0%        | 0%        | 0%        | 0%        | 0%        | 0%        | 0%        | 0%        | 2%        | 2%        |    |
| Shared Lane Traffic (%) | 0         | 473       | 0         | 0         | 35        | 0         | 0         | 445       | 0         | 0         | 152       | 0         |    |
| Lane Group Flow (vph)   | Perm      | NA        | Perm      | NA        | Perm      | NA        | Perm      | NA        | Perm      | NA        | Perm      | NA        |    |
| Turn Type               | Protected | Protected | Protected | Protected | Protected | Protected | Protected | Protected | Protected | Protected | Protected | Protected |    |
| Permitted Phases        | 1         | 1         | 1         | 1         | 1         | 2         | 2         | 2         | 2         | 2         | 2         | 3         |    |
| Detector Phase          | 1         | 1         | 1         | 1         | 1         | 2         | 2         | 2         | 2         | 2         | 2         | 2         |    |
| Switch Phase            |           |           |           |           |           |           |           |           |           |           |           |           |    |
| Minimum Initial (s)     | 8.0       | 8.0       | 8.0       | 8.0       | 8.0       | 8.0       | 8.0       | 8.0       | 8.0       | 8.0       | 8.0       | 8.0       |    |
| Minimum Split (s)       | 13.0      | 13.0      | 13.0      | 13.0      | 13.0      | 14.0      | 14.0      | 14.0      | 14.0      | 14.0      | 14.0      | 18.0      |    |
| Total Split (s)         | 35.0      | 35.0      | 35.0      | 35.0      | 35.0      | 36.0      | 36.0      | 36.0      | 36.0      | 36.0      | 36.0      | 25.0      |    |
| Total Split (%)         | 36.5%     | 36.5%     | 36.5%     | 36.5%     | 36.5%     | 37.5%     | 37.5%     | 37.5%     | 37.5%     | 37.5%     | 37.5%     | 26%       |    |
| Yellow Time (s)         | 4.0       | 4.0       | 4.0       | 4.0       | 4.0       | 4.0       | 4.0       | 4.0       | 4.0       | 4.0       | 4.0       | 4.0       |    |
| All-Red Time (s)        | 1.0       | 1.0       | 1.0       | 1.0       | 1.0       | 2.0       | 2.0       | 2.0       | 2.0       | 2.0       | 2.0       | 1.0       |    |
| Lost Time Adjust (s)    | 0.0       | 0.0       | 0.0       | 0.0       | 0.0       | 0.0       | 0.0       | 0.0       | 0.0       | 0.0       | 0.0       | 0.0       |    |
| Total Lost Time (s)     | 5.0       | 5.0       | 5.0       | 5.0       | 5.0       | 6.0       | 6.0       | 6.0       | 6.0       | 6.0       | 6.0       | 6.0       |    |
| Lead/Lag                | Lead      | Lead      | Lead      | Lead      | Lead      | Lag       | Lag       | Lag       | Lag       | Lag       | Lag       | Lag       |    |
| Lead-Lag Optimize?      |           |           |           |           |           |           |           |           |           |           |           |           |    |
| Recall Mode             | Min       | Min       | Min       | Min       | Min       | Min       | Min       | Min       | Min       | Min       | Min       | None      |    |
| Act Effct Green (s)     | 11.5      | 11.5      | 11.5      | 11.5      | 11.5      | 31.2      | 31.2      | 31.2      | 31.2      | 31.2      | 31.2      | 31.2      |    |
| Actuated g/C Ratio      | 0.20      | 0.20      | 0.20      | 0.20      | 0.20      | 0.55      | 0.55      | 0.55      | 0.55      | 0.55      | 0.55      | 0.55      |    |
| v/c Ratio               | 0.70      | 0.70      | 0.70      | 0.70      | 0.70      | 0.62      | 0.62      | 0.62      | 0.62      | 0.62      | 0.62      | 0.62      |    |
| Control Delay           | 9.7       | 9.7       | 9.7       | 9.7       | 9.7       | 18.4      | 18.4      | 18.4      | 18.4      | 18.4      | 18.4      | 18.4      |    |
| Queue Delay             | 0.0       | 0.0       | 0.0       | 0.0       | 0.0       | 0.0       | 0.0       | 0.0       | 0.0       | 0.0       | 0.0       | 0.0       |    |
| Total Delay             | 9.7       | 9.7       | 9.7       | 9.7       | 9.7       | 18.4      | 18.4      | 18.4      | 18.4      | 18.4      | 18.4      | 18.4      |    |
| LOS                     | A         | A         | A         | A         | A         | B         | B         | B         | B         | B         | B         | A         |    |
| Approach Delay          | 9.7       | 9.7       | 9.7       | 9.7       | 9.7       | 18.4      | 18.4      | 18.4      | 18.4      | 18.4      | 18.4      | 18.4      |    |
| Approach LOS            | A         | A         | A         | A         | A         | B         | B         | B         | B         | B         | B         | A         |    |
| Queue Length 50th (ft)  | 8         | 8         | 8         | 8         | 8         | 64        | 64        | 64        | 64        | 64        | 64        | 15        |    |
| Queue Length 95th (ft)  | 92        | 92        | 92        | 92        | 92        | 36        | 36        | 36        | 36        | 36        | 36        | 91        |    |
| Internal Link Dist (ft) | 1975      | 1975      | 1975      | 1975      | 1975      | 412       | 412       | 412       | 412       | 412       | 412       | 682       |    |
| Turn Bay Length (ft)    |           |           |           |           |           |           |           |           |           |           |           |           |    |
| Base Capacity (vph)     | 1076      | 1076      | 1076      | 1076      | 1076      | 478       | 478       | 478       | 478       | 478       | 478       | 992       |    |
| Starvation Cap Reductn  | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         |    |
| Spillback Cap Reductn   | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         |    |
| Storage Cap Reductn     | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0         |    |
| Reduced v/c Ratio       | 0.44      | 0.44      | 0.44      | 0.44      | 0.44      | 0.07      | 0.07      | 0.07      | 0.07      | 0.07      | 0.07      | 0.15      |    |

| Intersection Summary                                            |                        |
|-----------------------------------------------------------------|------------------------|
| Area Type:                                                      | Other                  |
| Cycle Length: 96                                                |                        |
| Actuated Cycle Length: 56.6                                     |                        |
| Natural Cycle: 65                                               |                        |
| Control Type: Actuated-Uncoordinated                            |                        |
| Maximum v/c Ratio: 0.70                                         |                        |
| Intersection Signal Delay: 13.6                                 | Intersection LOS: B    |
| Intersection Capacity Utilization 71.2%                         | ICU Level of Service C |
| Analysis Period (min) 15                                        |                        |
| # 95th percentile volume exceeds capacity, queue may be longer. |                        |
| Queue shown is maximum after two cycles.                        |                        |



12239.00 :: Needham Street  
5: Oak Street & Site Driveway

2025 Build Conditions without Shuttle Service  
Timing Plan: Saturday Midday

| Intersection             |      |      |      |      |      |      |
|--------------------------|------|------|------|------|------|------|
| Int Delay, s/veh         | 4    |      |      |      |      |      |
| Movement                 | WBL  | WBR  | NBT  | NBR  | SBL  | SBT  |
| Lane Configurations      | ↔    | ↔    | ↔    | ↔    | ↔    | ↔    |
| Traffic Vol, veh/h       | 75   | 65   | 345  | 70   | 70   | 470  |
| Future Vol, veh/h        | 75   | 65   | 345  | 70   | 70   | 470  |
| Conflicting Peds. #/hr   | 0    | 2    | 0    | 6    | 6    | 0    |
| Sign Control             | Stop | Stop | Free | Free | Free | Free |
| RT Channelized           | -    | None | -    | None | -    | None |
| Storage Length           | 0    | -    | -    | -    | -    | -    |
| Veh in Median Storage, # | 0    | -    | 0    | -    | -    | 0    |
| Grade, %                 | 0    | -    | 0    | -    | -    | 0    |
| Peak Hour Factor         | 92   | 92   | 92   | 92   | 92   | 92   |
| Heavy Vehicles, %        | 0    | 0    | 0    | 0    | 0    | 0    |
| Mvmt Flow                | 82   | 71   | 375  | 76   | 76   | 511  |

| Major/Minor          | Minor1 | Major1 | Major2 |      |
|----------------------|--------|--------|--------|------|
| Conflicting Flow All | 1082   | 421    | 0      | 457  |
| Stage 1              | 419    | -      | -      | -    |
| Stage 2              | 663    | -      | -      | -    |
| Critical Hdwy        | 6.4    | 6.2    | -      | 4.1  |
| Critical Hdwy Stg 1  | 5.4    | -      | -      | -    |
| Critical Hdwy Stg 2  | 5.4    | -      | -      | -    |
| Follow-up Hdwy       | 3.5    | 3.3    | -      | 2.2  |
| Pot Cap-1 Maneuver   | 243    | 637    | -      | 1114 |
| Stage 1              | 668    | -      | -      | -    |
| Stage 2              | 516    | -      | -      | -    |
| Platoon blocked, %   |        | -      | -      | -    |
| Mov Cap-1 Maneuver   | 219    | 633    | -      | 1112 |
| Mov Cap-2 Maneuver   | 219    | -      | -      | -    |
| Stage 1              | 665    | -      | -      | -    |
| Stage 2              | 467    | -      | -      | -    |

| Approach             | WB   | NB | SB  |
|----------------------|------|----|-----|
| HCM Control Delay, s | 26.8 | 0  | 1.1 |
| HCM LOS              | D    |    |     |

| Minor Lane/Major Mvmt | NBT | NBR | WBLn1 | SBL   | SBT |
|-----------------------|-----|-----|-------|-------|-----|
| Capacity (veh/h)      | -   | -   | 314   | 1112  | -   |
| HCM Lane V/C Ratio    | -   | -   | 0.485 | 0.068 | -   |
| HCM Control Delay (s) | -   | -   | 26.8  | 8.5   | 0   |
| HCM Lane LOS          | -   | -   | D     | A     | A   |
| HCM 95th %ile Q(veh)  | -   | -   | 2.5   | 0.2   | -   |

12239.00 :: Needham Street  
6: Needham Street & Oak Street/Christina Street

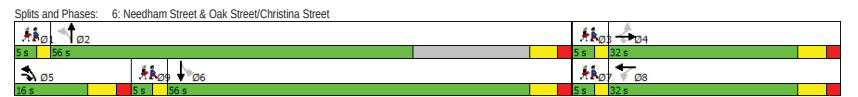
2025 Build Conditions without Shuttle Service  
Timing Plan: Saturday Midday

| Lane Group              | EBL   | EBT   | EBR   | WBL   | WBT   | WBR  | NBL   | NBT   | NBR  | SBL   | SBT   | SBR  | Ø1   | Ø3   | Ø7   | Ø9   |
|-------------------------|-------|-------|-------|-------|-------|------|-------|-------|------|-------|-------|------|------|------|------|------|
| Lane Configurations     |       | ←     | ←     | ←     | ←     | ←    | ←     | ←     | ←    | ←     | ←     | ←    |      |      |      |      |
| Traffic Volume (vph)    | 255   | 80    | 200   | 130   | 100   | 70   | 160   | 765   | 55   | 40    | 835   | 155  |      |      |      |      |
| Future Volume (vph)     | 255   | 80    | 200   | 130   | 100   | 70   | 160   | 765   | 55   | 40    | 835   | 155  |      |      |      |      |
| Ideal Flow (vphpl)      | 1900  | 1900  | 1900  | 1900  | 1900  | 1900 | 1900  | 1900  | 1900 | 1900  | 1900  | 1900 |      |      |      |      |
| Storage Length (ft)     | 0     |       | 100   | 200   |       | 50   | 0     |       | 0    | 220   |       | 0    |      |      |      |      |
| Storage Lanes           | 0     |       | 1     |       |       | 0    | 1     |       | 0    | 1     |       | 0    |      |      |      |      |
| Taper Length (ft)       | 25    |       |       | 25    |       |      | 25    |       |      | 25    |       |      |      |      |      |      |
| Satd. Flow (prot)       | 0     | 1830  | 1615  | 1805  | 1758  | 0    | 1805  | 1877  | 0    | 1787  | 1832  | 0    |      |      |      |      |
| Flt Permitted           |       | 0.523 |       | 0.303 |       |      | 0.069 |       |      | 0.183 |       |      |      |      |      |      |
| Satd. Flow (perm)       | 0     | 987   | 1615  | 576   | 1758  | 0    | 131   | 1877  | 0    | 344   | 1832  | 0    |      |      |      |      |
| Right Turn on Red       |       |       | Yes   |       |       | Yes  |       |       | Yes  |       |       | Yes  |      |      |      |      |
| Satd. Flow (RTOR)       |       |       | 149   |       | 29    |      |       | 5     |      |       | 10    |      |      |      |      |      |
| Link Speed (mph)        |       | 30    |       |       | 30    |      |       | 30    |      |       | 30    |      |      |      |      |      |
| Link Distance (ft)      |       | 1238  |       |       | 516   |      |       | 754   |      |       | 361   |      |      |      |      |      |
| Travel Time (s)         |       | 28.1  |       |       | 11.7  |      |       | 17.1  |      |       | 8.2   |      |      |      |      |      |
| Confl. Peds. (#/hr)     | 3     |       |       |       |       | 3    |       |       | 3    | 3     |       |      |      |      |      |      |
| Confl. Bikes (#/hr)     |       |       |       |       |       |      |       | 1     |      |       |       | 1    |      |      |      |      |
| Peak Hour Factor        | 0.92  | 0.92  | 0.92  | 0.92  | 0.92  | 0.92 | 0.92  | 0.92  | 0.92 | 0.92  | 0.92  | 0.92 |      |      |      |      |
| Heavy Vehicles (%)      | 0%    | 0%    | 0%    | 0%    | 0%    | 0%   | 0%    | 0%    | 0%   | 1%    | 1%    | 1%   |      |      |      |      |
| Shared Lane Traffic (%) |       |       |       |       |       |      |       |       |      |       |       |      |      |      |      |      |
| Lane Group Flow (vph)   | 0     | 364   | 217   | 141   | 185   | 0    | 174   | 892   | 0    | 43    | 1076  | 0    |      |      |      |      |
| Turn Type               | Perm  | NA    | pm+ov | Perm  | NA    |      | pm+pt | NA    |      | Perm  | NA    |      |      |      |      |      |
| Protected Phases        |       | 4     | 5     |       | 8     |      | 5     | 2     |      | 6     |       |      | 1    | 3    | 7    | 9    |
| Permitted Phases        | 4     |       | 4     | 8     |       |      | 2     |       |      | 6     |       |      |      |      |      |      |
| Detector Phase          | 4     | 4     | 5     | 8     | 8     |      | 5     | 2     |      | 6     | 6     |      |      |      |      |      |
| Switch Phase            |       |       |       |       |       |      |       |       |      |       |       |      |      |      |      |      |
| Minimum Initial (s)     | 6.0   | 6.0   | 6.0   | 6.0   | 6.0   |      | 6.0   | 15.0  |      | 15.0  | 15.0  |      | 3.0  | 3.0  | 3.0  | 3.0  |
| Minimum Split (s)       | 22.0  | 22.0  | 13.0  | 26.0  | 26.0  |      | 13.0  | 29.0  |      | 28.0  | 28.0  |      | 5.0  | 5.0  | 5.0  | 5.0  |
| Total Split (s)         | 32.0  | 32.0  | 16.0  | 32.0  | 32.0  |      | 16.0  | 56.0  |      | 56.0  | 56.0  |      | 5.0  | 5.0  | 5.0  | 5.0  |
| Total Split (%)         | 28.1% | 28.1% | 14.0% | 28.1% | 28.1% |      | 14.0% | 49.1% |      | 49.1% | 49.1% |      | 4%   | 4%   | 4%   | 4%   |
| Yellow Time (s)         | 4.0   | 4.0   | 4.0   | 4.0   | 4.0   |      | 4.0   | 4.0   |      | 4.0   | 4.0   |      | 2.0  | 2.0  | 2.0  | 2.0  |
| All-Red Time (s)        | 2.0   | 2.0   | 2.0   | 2.0   | 2.0   |      | 2.0   | 2.0   |      | 2.0   | 2.0   |      | 0.0  | 0.0  | 0.0  | 0.0  |
| Lost Time Adjust (s)    | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   |      | 0.0   | 0.0   |      | 0.0   | 0.0   |      |      |      |      |      |
| Total Lost Time (s)     | 6.0   | 6.0   | 6.0   | 6.0   | 6.0   |      | 6.0   | 6.0   |      | 6.0   | 6.0   |      |      |      |      |      |
| Lead/Lag                | Lag   | Lag   | Lead  | Lag   | Lag   |      | Lead  | Lag   |      |       |       |      | Lead | Lead | Lead | Lag  |
| Lead-Lag Optimize?      |       |       |       |       |       |      |       |       |      |       |       |      |      |      |      |      |
| Recall Mode             | None  | None  | None  | None  | None  |      | None  | None  |      | None  | None  |      | None | None | None | None |
| Act Effect Green (s)    | 27.0  | 42.7  | 26.0  | 26.0  |       |      | 65.7  | 64.8  |      | 50.0  | 50.0  |      |      |      |      |      |
| Actuated g/C Ratio      | 0.26  | 0.41  | 0.25  | 0.25  |       |      | 0.63  | 0.62  |      | 0.48  | 0.48  |      |      |      |      |      |
| v/c Ratio               | 1.43  | 0.29  | 0.99  | 0.40  |       |      | 0.73  | 0.77  |      | 0.26  | 1.22  |      |      |      |      |      |
| Control Delay           | 248.6 | 8.0   | 113.8 | 31.0  |       |      | 39.3  | 20.9  |      | 22.4  | 137.7 |      |      |      |      |      |
| Queue Delay             | 0.0   | 0.0   | 0.0   | 0.0   |       |      | 0.0   | 0.0   |      | 0.0   | 0.0   |      |      |      |      |      |
| Total Delay             | 248.6 | 8.0   | 113.8 | 31.0  |       |      | 39.3  | 20.9  |      | 22.4  | 137.7 |      |      |      |      |      |
| LOS                     | F     | A     | F     | C     |       |      | D     | C     |      | C     | F     |      |      |      |      |      |
| Approach Delay          | 158.8 |       |       | 66.8  |       |      | 23.9  |       |      |       | 133.3 |      |      |      |      |      |
| Approach LOS            | F     |       |       | E     |       |      | C     |       |      |       | F     |      |      |      |      |      |
| Queue Length 50th (ft)  | ~334  | 28    | 93    | 86    |       |      | 61    | 376   |      | 16    | ~881  |      |      |      |      |      |
| Queue Length 95th (ft)  | #510  | 75    | #232  | 160   |       |      | #173  | #710  |      | 48    | #1209 |      |      |      |      |      |
| Internal Link Dist (ft) | 1158  |       |       | 436   |       |      | 674   |       |      | 281   |       |      |      |      |      |      |
| Turn Bay Length (ft)    |       | 100   | 200   |       |       |      |       |       |      | 220   |       |      |      |      |      |      |
| Base Capacity (vph)     | 254   | 751   | 143   | 458   |       |      | 242   | 1185  |      | 164   | 880   |      |      |      |      |      |
| Starvation Cap Reductn  | 0     | 0     | 0     | 0     |       |      | 0     | 0     |      | 0     | 0     |      |      |      |      |      |
| Spillback Cap Reductn   | 0     | 0     | 0     | 0     |       |      | 0     | 0     |      | 0     | 0     |      |      |      |      |      |
| Storage Cap Reductn     | 0     | 0     | 0     | 0     |       |      | 0     | 0     |      | 0     | 0     |      |      |      |      |      |
| Reduced v/c Ratio       | 1.43  | 0.29  | 0.99  | 0.40  |       |      | 0.72  | 0.75  |      | 0.26  | 1.22  |      |      |      |      |      |

| Intersection Summary                                            |                        |
|-----------------------------------------------------------------|------------------------|
| Area Type:                                                      | Other                  |
| Cycle Length: 114                                               |                        |
| Actuated Cycle Length: 104.7                                    |                        |
| Natural Cycle: 150                                              |                        |
| Control Type: Actuated-Uncoordinated                            |                        |
| Maximum v/c Ratio: 1.43                                         |                        |
| Intersection Signal Delay: 93.4                                 | Intersection LOS: F    |
| Intersection Capacity Utilization 110.3%                        | ICU Level of Service H |
| Analysis Period (min) 15                                        |                        |
| - Volume exceeds capacity, queue is theoretically infinite.     |                        |
| Queue shown is maximum after two cycles.                        |                        |
| # 95th percentile volume exceeds capacity, queue may be longer. |                        |
| Queue shown is maximum after two cycles.                        |                        |

12239.00 :: Needham Street  
6: Needham Street & Oak Street/Christina Street

2025 Build Conditions without Shuttle Service  
Timing Plan: Saturday Midday



12239.00 :: Needham Street  
7: Needham Street & South Site Driveway

2025 Build Conditions without Shuttle Service  
Timing Plan: Saturday MIDDAY

| Intersection             |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
|--------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|
| Int Delay, s/veh         | 16.2                                                                              |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| Movement                 | EBL                                                                               | EBR                                                                               | NBL                                                                               | NBT                                                                               | SBT                                                                               | SBR                                                                               |
| Lane Configurations      |  |  |  |  |  |  |
| Traffic Vol, veh/h       | 20                                                                                | 165                                                                               | 110                                                                               | 980                                                                               | 865                                                                               | 70                                                                                |
| Future Vol, veh/h        | 20                                                                                | 165                                                                               | 110                                                                               | 980                                                                               | 865                                                                               | 70                                                                                |
| Conflicting Peds, #/hr   | 0                                                                                 | 0                                                                                 | 8                                                                                 | 0                                                                                 | 0                                                                                 | 8                                                                                 |
| Sign Control             | Stop                                                                              | Stop                                                                              | Free                                                                              | Free                                                                              | Free                                                                              | Free                                                                              |
| RT Channelized           | -                                                                                 | None                                                                              | -                                                                                 | None                                                                              | -                                                                                 | None                                                                              |
| Storage Length           | 0                                                                                 | -                                                                                 | 50                                                                                | -                                                                                 | -                                                                                 | -                                                                                 |
| Veh in Median Storage, # | 0                                                                                 | -                                                                                 | -                                                                                 | 0                                                                                 | 0                                                                                 | -                                                                                 |
| Grade, %                 | 0                                                                                 | -                                                                                 | -                                                                                 | 0                                                                                 | 0                                                                                 | -                                                                                 |
| Peak Hour Factor         | 92                                                                                | 92                                                                                | 92                                                                                | 92                                                                                | 92                                                                                | 92                                                                                |
| Heavy Vehicles, %        | 0                                                                                 | 0                                                                                 | 0                                                                                 | 0                                                                                 | 1                                                                                 | 1                                                                                 |
| Mvmt Flow                | 22                                                                                | 179                                                                               | 120                                                                               | 1065                                                                              | 940                                                                               | 76                                                                                |
| Major/Minor              |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| Minor2                   | Major1                                                                            |                                                                                   | Major2                                                                            |                                                                                   |                                                                                   |                                                                                   |
| Conflicting Flow All     | 2290                                                                              | 986                                                                               | 1024                                                                              | 0                                                                                 | -                                                                                 | 0                                                                                 |
| Stage 1                  | 986                                                                               | -                                                                                 | -                                                                                 | -                                                                                 | -                                                                                 | -                                                                                 |
| Stage 2                  | 1304                                                                              | -                                                                                 | -                                                                                 | -                                                                                 | -                                                                                 | -                                                                                 |
| Critical Hdwy            | 6.4                                                                               | 6.2                                                                               | 4.1                                                                               | -                                                                                 | -                                                                                 | -                                                                                 |
| Critical Hdwy Stg 1      | 5.4                                                                               | -                                                                                 | -                                                                                 | -                                                                                 | -                                                                                 | -                                                                                 |
| Critical Hdwy Stg 2      | 5.4                                                                               | -                                                                                 | -                                                                                 | -                                                                                 | -                                                                                 | -                                                                                 |
| Follow-up Hdwy           | 3.5                                                                               | 3.3                                                                               | 2.2                                                                               | -                                                                                 | -                                                                                 | -                                                                                 |
| Pot Cap-1 Maneuver       | 44                                                                                | 303                                                                               | 686                                                                               | -                                                                                 | -                                                                                 | -                                                                                 |
| Stage 1                  | 364                                                                               | -                                                                                 | -                                                                                 | -                                                                                 | -                                                                                 | -                                                                                 |
| Stage 2                  | 257                                                                               | -                                                                                 | -                                                                                 | -                                                                                 | -                                                                                 | -                                                                                 |
| Platoon blocked, %       | -                                                                                 | -                                                                                 | -                                                                                 | -                                                                                 | -                                                                                 | -                                                                                 |
| Mov Cap-1 Maneuver       | 36                                                                                | 301                                                                               | 686                                                                               | -                                                                                 | -                                                                                 | -                                                                                 |
| Mov Cap-2 Maneuver       | 36                                                                                | -                                                                                 | -                                                                                 | -                                                                                 | -                                                                                 | -                                                                                 |
| Stage 1                  | 362                                                                               | -                                                                                 | -                                                                                 | -                                                                                 | -                                                                                 | -                                                                                 |
| Stage 2                  | 211                                                                               | -                                                                                 | -                                                                                 | -                                                                                 | -                                                                                 | -                                                                                 |
| Approach                 |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| EB                       | NB                                                                                |                                                                                   | SB                                                                                |                                                                                   |                                                                                   |                                                                                   |
| HCM Control Delay, s     | 187                                                                               | 1.1                                                                               | -                                                                                 | 0                                                                                 | -                                                                                 | -                                                                                 |
| HCM LOS                  | F                                                                                 | -                                                                                 | -                                                                                 | -                                                                                 | -                                                                                 | -                                                                                 |
| Minor Lane/Major Mvmt    |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| NBL                      | NBT                                                                               | EBLn1                                                                             | SBT                                                                               | SBR                                                                               |                                                                                   |                                                                                   |
| Capacity (veh/h)         | 686                                                                               | -                                                                                 | 168                                                                               | -                                                                                 | -                                                                                 | -                                                                                 |
| HCM Lane V/C Ratio       | 0.174                                                                             | -                                                                                 | 1.197                                                                             | -                                                                                 | -                                                                                 | -                                                                                 |
| HCM Control Delay (s)    | 11.4                                                                              | -                                                                                 | 187                                                                               | -                                                                                 | -                                                                                 | -                                                                                 |
| HCM Lane LOS             | B                                                                                 | -                                                                                 | F                                                                                 | -                                                                                 | -                                                                                 | -                                                                                 |
| HCM 95th %ile Q(veh)     | 0.6                                                                               | -                                                                                 | 11                                                                                | -                                                                                 | -                                                                                 | -                                                                                 |

12239.00 :: Needham Street  
8: Needham Street & TJMaxx Driveway

2025 Build Conditions without Shuttle Service  
Timing Plan: Saturday MIDDAY

| Intersection             |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
|--------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
| Int Delay, s/veh         | 0.2                                                                                 |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Movement                 | WBL                                                                                 | WBR                                                                                 | NBT                                                                                 | NBR                                                                                 | SBL                                                                                 | SBT                                                                                 |
| Lane Configurations      |  |  |  |  |  |  |
| Traffic Vol, veh/h       | 5                                                                                   | 10                                                                                  | 985                                                                                 | 10                                                                                  | 10                                                                                  | 925                                                                                 |
| Future Vol, veh/h        | 5                                                                                   | 10                                                                                  | 985                                                                                 | 10                                                                                  | 10                                                                                  | 925                                                                                 |
| Conflicting Peds, #/hr   | 0                                                                                   | 1                                                                                   | 0                                                                                   | 7                                                                                   | 7                                                                                   | 0                                                                                   |
| Sign Control             | Stop                                                                                | Stop                                                                                | Free                                                                                | Free                                                                                | Free                                                                                | Free                                                                                |
| RT Channelized           | -                                                                                   | None                                                                                | -                                                                                   | None                                                                                | -                                                                                   | None                                                                                |
| Storage Length           | -                                                                                   | 0                                                                                   | -                                                                                   | -                                                                                   | 80                                                                                  | -                                                                                   |
| Veh in Median Storage, # | 0                                                                                   | -                                                                                   | 0                                                                                   | -                                                                                   | -                                                                                   | 0                                                                                   |
| Grade, %                 | 0                                                                                   | -                                                                                   | 0                                                                                   | -                                                                                   | -                                                                                   | 0                                                                                   |
| Peak Hour Factor         | 92                                                                                  | 92                                                                                  | 92                                                                                  | 92                                                                                  | 92                                                                                  | 92                                                                                  |
| Heavy Vehicles, %        | 0                                                                                   | 0                                                                                   | 0                                                                                   | 0                                                                                   | 1                                                                                   | 1                                                                                   |
| Mvmt Flow                | 5                                                                                   | 11                                                                                  | 1071                                                                                | 11                                                                                  | 11                                                                                  | 1005                                                                                |
| Major/Minor              |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Minor1                   | Major1                                                                              |                                                                                     | Major2                                                                              |                                                                                     |                                                                                     |                                                                                     |
| Conflicting Flow All     | 2110                                                                                | 1084                                                                                | 0                                                                                   | 0                                                                                   | 1069                                                                                | 0                                                                                   |
| Stage 1                  | 1083                                                                                | -                                                                                   | -                                                                                   | -                                                                                   | -                                                                                   | -                                                                                   |
| Stage 2                  | 1027                                                                                | -                                                                                   | -                                                                                   | -                                                                                   | -                                                                                   | -                                                                                   |
| Critical Hdwy            | 6.4                                                                                 | 6.2                                                                                 | -                                                                                   | -                                                                                   | 4.11                                                                                | -                                                                                   |
| Critical Hdwy Stg 1      | 5.4                                                                                 | -                                                                                   | -                                                                                   | -                                                                                   | -                                                                                   | -                                                                                   |
| Critical Hdwy Stg 2      | 5.4                                                                                 | -                                                                                   | -                                                                                   | -                                                                                   | -                                                                                   | -                                                                                   |
| Follow-up Hdwy           | 3.5                                                                                 | 3.3                                                                                 | -                                                                                   | -                                                                                   | 2.209                                                                               | -                                                                                   |
| Pot Cap-1 Maneuver       | 57                                                                                  | 266                                                                                 | -                                                                                   | -                                                                                   | 644                                                                                 | -                                                                                   |
| Stage 1                  | 328                                                                                 | -                                                                                   | -                                                                                   | -                                                                                   | -                                                                                   | -                                                                                   |
| Stage 2                  | 348                                                                                 | -                                                                                   | -                                                                                   | -                                                                                   | -                                                                                   | -                                                                                   |
| Platoon blocked, %       | -                                                                                   | -                                                                                   | -                                                                                   | -                                                                                   | -                                                                                   | -                                                                                   |
| Mov Cap-1 Maneuver       | 56                                                                                  | 264                                                                                 | -                                                                                   | -                                                                                   | 643                                                                                 | -                                                                                   |
| Mov Cap-2 Maneuver       | 56                                                                                  | -                                                                                   | -                                                                                   | -                                                                                   | -                                                                                   | -                                                                                   |
| Stage 1                  | 326                                                                                 | -                                                                                   | -                                                                                   | -                                                                                   | -                                                                                   | -                                                                                   |
| Stage 2                  | 342                                                                                 | -                                                                                   | -                                                                                   | -                                                                                   | -                                                                                   | -                                                                                   |
| Approach                 |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| WB                       | NB                                                                                  |                                                                                     | SB                                                                                  |                                                                                     |                                                                                     |                                                                                     |
| HCM Control Delay, s     | 19.2                                                                                | 0                                                                                   | -                                                                                   | 0.1                                                                                 | -                                                                                   | -                                                                                   |
| HCM LOS                  | C                                                                                   | -                                                                                   | -                                                                                   | -                                                                                   | -                                                                                   | -                                                                                   |
| Minor Lane/Major Mvmt    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| NBT                      | NBR                                                                                 | WBLn1                                                                               | SBL                                                                                 | SBT                                                                                 |                                                                                     |                                                                                     |
| Capacity (veh/h)         | -                                                                                   | -                                                                                   | 264                                                                                 | 643                                                                                 | -                                                                                   | -                                                                                   |
| HCM Lane V/C Ratio       | -                                                                                   | -                                                                                   | 0.041                                                                               | 0.017                                                                               | -                                                                                   | -                                                                                   |
| HCM Control Delay (s)    | -                                                                                   | -                                                                                   | 19.2                                                                                | 10.7                                                                                | -                                                                                   | -                                                                                   |
| HCM Lane LOS             | -                                                                                   | -                                                                                   | C                                                                                   | B                                                                                   | -                                                                                   | -                                                                                   |
| HCM 95th %ile Q(veh)     | -                                                                                   | -                                                                                   | 0.1                                                                                 | 0.1                                                                                 | -                                                                                   | -                                                                                   |

12239.00 :: Needham Street  
9: Needham Street & North Site Driveway/Charlemont Street

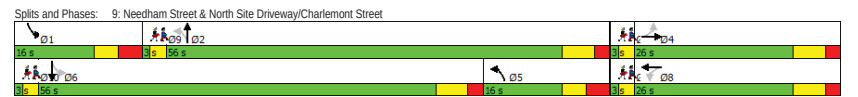
2025 Build Conditions without Shuttle Service  
Timing Plan: Saturday Midday

| Lane Group              | EBL                                                                               | EBT                                                                               | EBR  | WBL                                                                               | WBT                                                                               | WBR  | NBL                                                                               | NBT                                                                               | NBR  | SBL                                                                               | SBT                                                                               | SBR  | Ø3   | Ø7   | Ø9   | Ø10  |
|-------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|------|------|------|------|------|
| Lane Configurations     |  |  |      |  |  |      |  |  |      |  |  |      |      |      |      |      |
| Traffic Volume (vph)    | 175                                                                               | 0                                                                                 | 100  | 60                                                                                | 2                                                                                 | 35   | 135                                                                               | 830                                                                               | 30   | 15                                                                                | 775                                                                               | 145  |      |      |      |      |
| Future Volume (vph)     | 175                                                                               | 0                                                                                 | 100  | 60                                                                                | 2                                                                                 | 35   | 135                                                                               | 830                                                                               | 30   | 15                                                                                | 775                                                                               | 145  |      |      |      |      |
| Ideal Flow (vphpl)      | 1900                                                                              | 1900                                                                              | 1900 | 1900                                                                              | 1900                                                                              | 1900 | 1900                                                                              | 1900                                                                              | 1900 | 1900                                                                              | 1900                                                                              | 1900 |      |      |      |      |
| Storage Length (ft)     | 125                                                                               | 0                                                                                 | 1    | 125                                                                               | 0                                                                                 | 100  | 0                                                                                 | 100                                                                               | 0    | 100                                                                               | 0                                                                                 | 0    |      |      |      |      |
| Storage Lanes           | 1                                                                                 | 0                                                                                 | 1    | 1                                                                                 | 0                                                                                 | 1    | 0                                                                                 | 1                                                                                 | 0    | 1                                                                                 | 0                                                                                 | 0    |      |      |      |      |
| Taper Length (ft)       | 25                                                                                | 0                                                                                 | 25   | 25                                                                                | 0                                                                                 | 25   | 0                                                                                 | 25                                                                                | 0    | 25                                                                                | 0                                                                                 | 0    |      |      |      |      |
| Satd. Flow (prot)       | 1805                                                                              | 1615                                                                              | 0    | 1805                                                                              | 1628                                                                              | 0    | 1805                                                                              | 1887                                                                              | 0    | 1787                                                                              | 1824                                                                              | 0    |      |      |      |      |
| Flt Permitted           | 0.731                                                                             |                                                                                   |      | 0.687                                                                             |                                                                                   |      | 0.083                                                                             |                                                                                   |      | 0.083                                                                             |                                                                                   |      |      |      |      |      |
| Satd. Flow (perm)       | 1389                                                                              | 1615                                                                              | 0    | 1305                                                                              | 1628                                                                              | 0    | 158                                                                               | 1887                                                                              | 0    | 156                                                                               | 1824                                                                              | 0    |      |      |      |      |
| Right Turn on Red       |                                                                                   |                                                                                   | Yes  |                                                                                   |                                                                                   | Yes  |                                                                                   |                                                                                   | Yes  |                                                                                   |                                                                                   | Yes  |      |      |      |      |
| Satd. Flow (RTOR)       |                                                                                   | 322                                                                               |      |                                                                                   | 38                                                                                |      |                                                                                   | 2                                                                                 |      |                                                                                   | 13                                                                                |      |      |      |      |      |
| Link Speed (mph)        |                                                                                   | 30                                                                                |      |                                                                                   | 30                                                                                |      |                                                                                   | 30                                                                                |      |                                                                                   | 30                                                                                |      |      |      |      |      |
| Link Distance (ft)      |                                                                                   | 491                                                                               |      |                                                                                   | 556                                                                               |      |                                                                                   | 244                                                                               |      |                                                                                   | 497                                                                               |      |      |      |      |      |
| Travel Time (s)         |                                                                                   | 11.2                                                                              |      |                                                                                   | 12.6                                                                              |      |                                                                                   | 5.5                                                                               |      |                                                                                   | 11.3                                                                              |      |      |      |      |      |
| Confl. Peds. (#/hr)     |                                                                                   |                                                                                   |      |                                                                                   |                                                                                   |      | 7                                                                                 |                                                                                   | 8    | 8                                                                                 |                                                                                   | 7    |      |      |      |      |
| Confl. Bikes (#/hr)     |                                                                                   |                                                                                   |      |                                                                                   |                                                                                   |      |                                                                                   | 2                                                                                 |      |                                                                                   |                                                                                   | 1    |      |      |      |      |
| Peak Hour Factor        | 0.92                                                                              | 0.92                                                                              | 0.92 | 0.92                                                                              | 0.92                                                                              | 0.92 | 0.92                                                                              | 0.92                                                                              | 0.92 | 0.92                                                                              | 0.92                                                                              | 0.92 |      |      |      |      |
| Heavy Vehicles (%)      | 0%                                                                                | 0%                                                                                | 0%   | 0%                                                                                | 0%                                                                                | 0%   | 0%                                                                                | 0%                                                                                | 0%   | 1%                                                                                | 1%                                                                                | 1%   |      |      |      |      |
| Shared Lane Traffic (%) |                                                                                   |                                                                                   |      |                                                                                   |                                                                                   |      |                                                                                   |                                                                                   |      |                                                                                   |                                                                                   |      |      |      |      |      |
| Lane Group Flow (vph)   | 190                                                                               | 109                                                                               | 0    | 65                                                                                | 40                                                                                | 0    | 147                                                                               | 935                                                                               | 0    | 16                                                                                | 1000                                                                              | 0    |      |      |      |      |
| Turn Type               | Perm                                                                              | NA                                                                                |      | Perm                                                                              | NA                                                                                |      | pm+pt                                                                             | NA                                                                                |      | pm+pt                                                                             | NA                                                                                |      |      |      |      |      |
| Protected Phases        | 4                                                                                 |                                                                                   |      | 8                                                                                 |                                                                                   |      | 5                                                                                 | 2                                                                                 |      | 1                                                                                 | 6                                                                                 |      | 3    | 7    | 9    | 10   |
| Permitted Phases        | 4                                                                                 |                                                                                   |      | 8                                                                                 |                                                                                   |      | 2                                                                                 |                                                                                   |      | 6                                                                                 |                                                                                   |      |      |      |      |      |
| Detector Phase          | 4                                                                                 | 4                                                                                 |      | 8                                                                                 | 8                                                                                 |      | 5                                                                                 | 2                                                                                 |      | 1                                                                                 | 6                                                                                 |      |      |      |      |      |
| Switch Phase            |                                                                                   |                                                                                   |      |                                                                                   |                                                                                   |      |                                                                                   |                                                                                   |      |                                                                                   |                                                                                   |      |      |      |      |      |
| Minimum Initial (s)     | 3.0                                                                               | 3.0                                                                               |      | 3.0                                                                               | 3.0                                                                               |      | 3.0                                                                               | 3.0                                                                               |      | 3.0                                                                               | 3.0                                                                               |      | 1.0  | 1.0  | 1.0  | 1.0  |
| Minimum Split (s)       | 23.0                                                                              | 23.0                                                                              |      | 23.0                                                                              | 23.0                                                                              |      | 9.0                                                                               | 22.0                                                                              |      | 9.0                                                                               | 22.0                                                                              |      | 3.0  | 3.0  | 3.0  | 3.0  |
| Total Split (s)         | 26.0                                                                              | 26.0                                                                              |      | 26.0                                                                              | 26.0                                                                              |      | 16.0                                                                              | 56.0                                                                              |      | 16.0                                                                              | 56.0                                                                              |      | 3.0  | 3.0  | 3.0  | 3.0  |
| Total Split (%)         | 25.0%                                                                             | 25.0%                                                                             |      | 25.0%                                                                             | 25.0%                                                                             |      | 15.4%                                                                             | 53.6%                                                                             |      | 15.4%                                                                             | 53.6%                                                                             |      | 3%   | 3%   | 3%   | 3%   |
| Yellow Time (s)         | 4.0                                                                               | 4.0                                                                               |      | 4.0                                                                               | 4.0                                                                               |      | 3.0                                                                               | 4.0                                                                               |      | 3.0                                                                               | 4.0                                                                               |      | 2.0  | 2.0  | 2.0  | 2.0  |
| All-Red Time (s)        | 2.0                                                                               | 2.0                                                                               |      | 2.0                                                                               | 2.0                                                                               |      | 3.0                                                                               | 2.0                                                                               |      | 3.0                                                                               | 2.0                                                                               |      | 0.0  | 0.0  | 0.0  | 0.0  |
| Lost Time Adjust (s)    | 0.0                                                                               | 0.0                                                                               |      | 0.0                                                                               | 0.0                                                                               |      | 0.0                                                                               | 0.0                                                                               |      | 0.0                                                                               | 0.0                                                                               |      |      |      |      |      |
| Total Lost Time (s)     | 6.0                                                                               | 6.0                                                                               |      | 6.0                                                                               | 6.0                                                                               |      | 6.0                                                                               | 6.0                                                                               |      | 6.0                                                                               | 6.0                                                                               |      |      |      |      |      |
| Lead/Lag                | Lag                                                                               | Lag                                                                               |      | Lag                                                                               | Lag                                                                               |      | Lead                                                                              | Lead                                                                              |      | Lag                                                                               | Lag                                                                               |      | Lead | Lead | Lag  | Lead |
| Lead-Lag Optimize?      |                                                                                   |                                                                                   |      |                                                                                   |                                                                                   |      |                                                                                   |                                                                                   |      |                                                                                   |                                                                                   |      |      |      |      |      |
| Recall Mode             | None                                                                              | None                                                                              |      | None                                                                              | None                                                                              |      | Min                                                                               | None                                                                              |      | Min                                                                               | None                                                                              |      | None | None | None | None |
| Act Effect Green (s)    | 16.1                                                                              | 16.1                                                                              |      | 16.1                                                                              | 16.1                                                                              |      | 59.0                                                                              | 59.0                                                                              |      | 50.8                                                                              | 50.3                                                                              |      |      |      |      |      |
| Actuated g/C Ratio      | 0.18                                                                              | 0.18                                                                              |      | 0.18                                                                              | 0.18                                                                              |      | 0.64                                                                              | 0.64                                                                              |      | 0.55                                                                              | 0.55                                                                              |      |      |      |      |      |
| v/c Ratio               | 0.78                                                                              | 0.20                                                                              |      | 0.29                                                                              | 0.13                                                                              |      | 0.65                                                                              | 0.77                                                                              |      | 0.09                                                                              | 1.00                                                                              |      |      |      |      |      |
| Control Delay           | 59.3                                                                              | 0.8                                                                               |      | 36.9                                                                              | 12.5                                                                              |      | 40.9                                                                              | 20.4                                                                              |      | 12.3                                                                              | 51.3                                                                              |      |      |      |      |      |
| Queue Delay             | 0.0                                                                               | 0.0                                                                               |      | 0.0                                                                               | 0.0                                                                               |      | 0.0                                                                               | 0.0                                                                               |      | 0.0                                                                               | 0.0                                                                               |      |      |      |      |      |
| Total Delay             | 59.3                                                                              | 0.8                                                                               |      | 36.9                                                                              | 12.5                                                                              |      | 40.9                                                                              | 20.4                                                                              |      | 12.3                                                                              | 51.3                                                                              |      |      |      |      |      |
| LOS                     | E                                                                                 | A                                                                                 |      | D                                                                                 | B                                                                                 |      | D                                                                                 | C                                                                                 |      | B                                                                                 | D                                                                                 |      |      |      |      |      |
| Approach Delay          |                                                                                   | 38.0                                                                              |      |                                                                                   | 27.6                                                                              |      |                                                                                   | 23.1                                                                              |      |                                                                                   | 50.7                                                                              |      |      |      |      |      |
| Approach LOS            |                                                                                   | D                                                                                 |      |                                                                                   | C                                                                                 |      |                                                                                   | C                                                                                 |      |                                                                                   | D                                                                                 |      |      |      |      |      |
| Queue Length 50th (ft)  | 105                                                                               | 0                                                                                 |      | 33                                                                                | 1                                                                                 |      | 26                                                                                | 303                                                                               |      | 4                                                                                 | -552                                                                              |      |      |      |      |      |
| Queue Length 95th (ft)  | #210                                                                              | 0                                                                                 |      | 75                                                                                | 29                                                                                |      | 107                                                                               | #817                                                                              |      | 15                                                                                | #980                                                                              |      |      |      |      |      |
| Internal Link Dist (ft) |                                                                                   | 411                                                                               |      |                                                                                   | 476                                                                               |      |                                                                                   | 164                                                                               |      |                                                                                   | 417                                                                               |      |      |      |      |      |
| Turn Bay Length (ft)    | 125                                                                               |                                                                                   |      | 125                                                                               |                                                                                   |      | 100                                                                               |                                                                                   |      | 100                                                                               |                                                                                   |      |      |      |      |      |
| Base Capacity (vph)     | 303                                                                               | 604                                                                               |      | 285                                                                               | 385                                                                               |      | 286                                                                               | 1211                                                                              |      | 264                                                                               | 1002                                                                              |      |      |      |      |      |
| Starvation Cap Reductn  | 0                                                                                 | 0                                                                                 |      | 0                                                                                 | 0                                                                                 |      | 0                                                                                 | 0                                                                                 |      | 0                                                                                 | 0                                                                                 |      |      |      |      |      |
| Spillback Cap Reductn   | 0                                                                                 | 0                                                                                 |      | 0                                                                                 | 0                                                                                 |      | 0                                                                                 | 0                                                                                 |      | 0                                                                                 | 0                                                                                 |      |      |      |      |      |
| Storage Cap Reductn     | 0                                                                                 | 0                                                                                 |      | 0                                                                                 | 0                                                                                 |      | 0                                                                                 | 0                                                                                 |      | 0                                                                                 | 0                                                                                 |      |      |      |      |      |
| Reduced v/c Ratio       | 0.63                                                                              | 0.18                                                                              |      | 0.23                                                                              | 0.10                                                                              |      | 0.51                                                                              | 0.77                                                                              |      | 0.06                                                                              | 1.00                                                                              |      |      |      |      |      |

| Intersection Summary                                            |                        |
|-----------------------------------------------------------------|------------------------|
| Area Type:                                                      | Other                  |
| Cycle Length:                                                   | 104                    |
| Actuated Cycle Length:                                          | 92                     |
| Natural Cycle:                                                  | 90                     |
| Control Type:                                                   | Actuated-Uncoordinated |
| Maximum v/c Ratio:                                              | 1.00                   |
| Intersection Signal Delay:                                      | 36.3                   |
| Intersection Capacity Utilization:                              | 88.6%                  |
| Analysis Period (min):                                          | 15                     |
| - Volume exceeds capacity, queue is theoretically infinite.     |                        |
| Queue shown is maximum after two cycles.                        |                        |
| # 95th percentile volume exceeds capacity, queue may be longer. |                        |
| Queue shown is maximum after two cycles.                        |                        |

12239.00 :: Needham Street  
9: Needham Street & North Site Driveway/Charlemont Street

2025 Build Conditions without Shuttle Service  
Timing Plan: Saturday Midday



12239.00 :: Needham Street  
10: Needham Street & Tower Road/Industrial Place

2025 Build Conditions without Shuttle Service  
Timing Plan: Saturday MIDDAY

| Intersection                                                                                                         |           |      |           |           |           |       |        |      |      |      |      |      |  |
|----------------------------------------------------------------------------------------------------------------------|-----------|------|-----------|-----------|-----------|-------|--------|------|------|------|------|------|--|
| Int Delay, s/veh                                                                                                     | 567.2     |      |           |           |           |       |        |      |      |      |      |      |  |
| Movement                                                                                                             | EBL       | EBT  | EBR       | WBL       | WBT       | WBR   | NBL    | NBT  | NBR  | SBL  | SBT  | SBR  |  |
| Lane Configurations                                                                                                  |           | ↕    |           |           | ↕         |       |        | ↕    |      | ↕    | ↕    |      |  |
| Traffic Vol, veh/h                                                                                                   | 115       | 10   | 85        | 40        | 20        | 55    | 45     | 970  | 20   | 20   | 810  | 85   |  |
| Future Vol, veh/h                                                                                                    | 115       | 10   | 85        | 40        | 20        | 55    | 45     | 970  | 20   | 20   | 810  | 85   |  |
| Conflicting Peds, #/hr                                                                                               | 1         | 0    | 5         | 5         | 0         | 1     | 8      | 0    | 10   | 10   | 0    | 8    |  |
| Sign Control                                                                                                         | Stop      | Stop | Stop      | Stop      | Stop      | Stop  | Free   | Free | Free | Free | Free | Free |  |
| RT Channelized                                                                                                       | -         | -    | None      | -         | -         | None  | -      | -    | None | -    | -    | None |  |
| Storage Length                                                                                                       | -         | -    | -         | -         | -         | -     | -      | -    | -    | 100  | -    | -    |  |
| Veh in Median Storage, #                                                                                             | -         | 0    | -         | -         | 0         | -     | -      | 0    | -    | -    | 0    | -    |  |
| Grade, %                                                                                                             | -         | 0    | -         | -         | 0         | -     | -      | 0    | -    | -    | 0    | -    |  |
| Peak Hour Factor                                                                                                     | 92        | 92   | 92        | 92        | 92        | 92    | 92     | 92   | 92   | 92   | 92   | 92   |  |
| Heavy Vehicles, %                                                                                                    | 0         | 0    | 0         | 0         | 0         | 0     | 0      | 0    | 0    | 0    | 0    | 0    |  |
| Mvmt Flow                                                                                                            | 125       | 11   | 92        | 43        | 22        | 60    | 49     | 1054 | 22   | 22   | 880  | 92   |  |
|                                                                                                                      |           |      |           |           |           |       |        |      |      |      |      |      |  |
| Major/Minor                                                                                                          | Minor2    |      | Minor1    |           | Major1    |       | Major2 |      |      |      |      |      |  |
| Conflicting Flow All                                                                                                 | 2183      | 2162 | 940       | 2200      | 2197      | 1076  | 981    | 0    | 0    | 1086 | 0    | 0    |  |
| Stage 1                                                                                                              | 978       | 978  | -         | 1173      | 1173      | -     | -      | -    | -    | -    | -    | -    |  |
| Stage 2                                                                                                              | 1205      | 1184 | -         | 1027      | 1024      | -     | -      | -    | -    | -    | -    | -    |  |
| Critical Hdwy                                                                                                        | 7.1       | 6.5  | 6.2       | 7.1       | 6.5       | 6.2   | 4.1    | -    | -    | 4.1  | -    | -    |  |
| Critical Hdwy Stg 1                                                                                                  | 6.1       | 5.5  | -         | 6.1       | 5.5       | -     | -      | -    | -    | -    | -    | -    |  |
| Critical Hdwy Stg 2                                                                                                  | 6.1       | 5.5  | -         | 6.1       | 5.5       | -     | -      | -    | -    | -    | -    | -    |  |
| Follow-up Hdwy                                                                                                       | 3.5       | 4    | 3.3       | 3.5       | 4         | 3.3   | 2.2    | -    | -    | 2.2  | -    | -    |  |
| Pot Cap-1 Maneuver                                                                                                   | ~ 33      | 48   | 322       | ~ 33      | 46        | 269   | 712    | -    | -    | 650  | -    | -    |  |
| Stage 1                                                                                                              | 304       | 331  | -         | 236       | 268       | -     | -      | -    | -    | -    | -    | -    |  |
| Stage 2                                                                                                              | 227       | 265  | -         | 285       | 315       | -     | -      | -    | -    | -    | -    | -    |  |
| Platoon blocked, %                                                                                                   | -         | -    | -         | -         | -         | -     | -      | -    | -    | -    | -    | -    |  |
| Mov Cap-1 Maneuver                                                                                                   | ~ 11      | 38   | 319       | ~ 15      | 36        | 267   | 709    | -    | -    | 649  | -    | -    |  |
| Mov Cap-2 Maneuver                                                                                                   | ~ 11      | 38   | -         | ~ 15      | 36        | -     | -      | -    | -    | -    | -    | -    |  |
| Stage 1                                                                                                              | 250       | 318  | -         | 194       | 220       | -     | -      | -    | -    | -    | -    | -    |  |
| Stage 2                                                                                                              | 131       | 217  | -         | 188       | 302       | -     | -      | -    | -    | -    | -    | -    |  |
|                                                                                                                      |           |      |           |           |           |       |        |      |      |      |      |      |  |
| Approach                                                                                                             | EB        |      | WB        |           | NB        |       | SB     |      |      |      |      |      |  |
| HCM Control Delay, s                                                                                                 | \$ 5349.4 |      | \$ 1446.5 |           | 0.5       |       | 0.2    |      |      |      |      |      |  |
| HCM LOS                                                                                                              | F         |      | F         |           |           |       |        |      |      |      |      |      |  |
|                                                                                                                      |           |      |           |           |           |       |        |      |      |      |      |      |  |
| Minor Lane/Major Mvmt                                                                                                | NBL       | NBT  | NBR       | EBLn1     | WBLn1     | SBL   | SBT    | SBR  |      |      |      |      |  |
| Capacity (veh/h)                                                                                                     | 709       | -    | -         | 19        | 34        | 649   | -      | -    |      |      |      |      |  |
| HCM Lane V/C Ratio                                                                                                   | 0.069     | -    | -         | 12.014    | 3.676     | 0.033 | -      | -    |      |      |      |      |  |
| HCM Control Delay (s)                                                                                                | 10.5      | 0    | -         | \$ 5349.4 | \$ 1446.5 | 10.7  | -      | -    |      |      |      |      |  |
| HCM Lane LOS                                                                                                         | B         | A    | -         | F         | F         | B     | -      | -    |      |      |      |      |  |
| HCM 95th %tile Q(veh)                                                                                                | 0.2       | -    | -         | 29.1      | 14.6      | 0.1   | -      | -    |      |      |      |      |  |
|                                                                                                                      |           |      |           |           |           |       |        |      |      |      |      |      |  |
| Notes                                                                                                                |           |      |           |           |           |       |        |      |      |      |      |      |  |
| ~: Volume exceeds capacity    \$: Delay exceeds 300s    +: Computation Not Defined    *: All major volume in platoon |           |      |           |           |           |       |        |      |      |      |      |      |  |

12239.00 :: Needham Street  
11: Needham Street & Jaconnet Street

2025 Build Conditions without Shuttle Service  
Timing Plan: Saturday MIDDAY

| Intersection             |                                                                                     |        |                                                                                     |        |                                                                                     |                                                                                     |
|--------------------------|-------------------------------------------------------------------------------------|--------|-------------------------------------------------------------------------------------|--------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
| Int Delay, s/veh         | 3.6                                                                                 |        |                                                                                     |        |                                                                                     |                                                                                     |
| Movement                 | WBL                                                                                 | WBR    | NBT                                                                                 | NBR    | SBL                                                                                 | SBT                                                                                 |
| Lane Configurations      |  |        |  |        |  |  |
| Traffic Vol, veh/h       | 25                                                                                  | 20     | 1120                                                                                | 30     | 20                                                                                  | 890                                                                                 |
| Future Vol, veh/h        | 25                                                                                  | 20     | 1120                                                                                | 30     | 20                                                                                  | 890                                                                                 |
| Conflicting Peds, #/hr   | 0                                                                                   | 0      | 0                                                                                   | 38     | 38                                                                                  | 0                                                                                   |
| Sign Control             | Stop                                                                                | Stop   | Free                                                                                | Free   | Free                                                                                | Free                                                                                |
| RT Channelized           | -                                                                                   | None   | -                                                                                   | None   | -                                                                                   | None                                                                                |
| Storage Length           | 0                                                                                   | -      | -                                                                                   | -      | 100                                                                                 | -                                                                                   |
| Veh in Median Storage, # | 0                                                                                   | -      | 0                                                                                   | -      | -                                                                                   | 0                                                                                   |
| Grade, %                 | 0                                                                                   | -      | 0                                                                                   | -      | -                                                                                   | 0                                                                                   |
| Peak Hour Factor         | 92                                                                                  | 92     | 92                                                                                  | 92     | 92                                                                                  | 92                                                                                  |
| Heavy Vehicles, %        | 0                                                                                   | 0      | 0                                                                                   | 0      | 0                                                                                   | 0                                                                                   |
| Mvmt Flow                | 27                                                                                  | 22     | 1217                                                                                | 33     | 22                                                                                  | 967                                                                                 |
|                          |                                                                                     |        |                                                                                     |        |                                                                                     |                                                                                     |
| Major/Minor              | Minor1                                                                              | Major1 |                                                                                     | Major2 |                                                                                     |                                                                                     |
| Conflicting Flow All     | 2283                                                                                | 1272   | 0                                                                                   | 0      | 1288                                                                                | 0                                                                                   |
| Stage 1                  | 1272                                                                                | -      | -                                                                                   | -      | -                                                                                   | -                                                                                   |
| Stage 2                  | 1011                                                                                | -      | -                                                                                   | -      | -                                                                                   | -                                                                                   |
| Critical Hdwy            | 6.4                                                                                 | 6.2    | -                                                                                   | -      | 4.1                                                                                 | -                                                                                   |
| Critical Hdwy Stg 1      | 5.4                                                                                 | -      | -                                                                                   | -      | -                                                                                   | -                                                                                   |
| Critical Hdwy Stg 2      | 5.4                                                                                 | -      | -                                                                                   | -      | -                                                                                   | -                                                                                   |
| Follow-up Hdwy           | 3.5                                                                                 | 3.3    | -                                                                                   | -      | 2.2                                                                                 | -                                                                                   |
| Pot Cap-1 Maneuver       | 44                                                                                  | 207    | -                                                                                   | -      | 545                                                                                 | -                                                                                   |
| Stage 1                  | 266                                                                                 | -      | -                                                                                   | -      | -                                                                                   | -                                                                                   |
| Stage 2                  | 355                                                                                 | -      | -                                                                                   | -      | -                                                                                   | -                                                                                   |
| Platoon blocked, %       | -                                                                                   | -      | -                                                                                   | -      | -                                                                                   | -                                                                                   |
| Mov Cap-1 Maneuver       | 41                                                                                  | 200    | -                                                                                   | -      | 545                                                                                 | -                                                                                   |
| Mov Cap-2 Maneuver       | 41                                                                                  | -      | -                                                                                   | -      | -                                                                                   | -                                                                                   |
| Stage 1                  | 258                                                                                 | -      | -                                                                                   | -      | -                                                                                   | -                                                                                   |
| Stage 2                  | 341                                                                                 | -      | -                                                                                   | -      | -                                                                                   | -                                                                                   |
|                          |                                                                                     |        |                                                                                     |        |                                                                                     |                                                                                     |
| Approach                 | WB                                                                                  | NB     |                                                                                     | SB     |                                                                                     |                                                                                     |
| HCM Control Delay, s     | 161.8                                                                               | 0      |                                                                                     | 0.3    |                                                                                     |                                                                                     |
| HCM LOS                  | F                                                                                   |        |                                                                                     |        |                                                                                     |                                                                                     |
|                          |                                                                                     |        |                                                                                     |        |                                                                                     |                                                                                     |
| Minor Lane/Major Mvmt    | NBT                                                                                 | NBR    | WBLn1                                                                               | SBL    | SBT                                                                                 |                                                                                     |
| Capacity (veh/h)         | -                                                                                   | -      | 63                                                                                  | 545    | -                                                                                   |                                                                                     |
| HCM Lane V/C Ratio       | -                                                                                   | -      | 0.776                                                                               | 0.04   | -                                                                                   |                                                                                     |
| HCM Control Delay (s)    | -                                                                                   | -      | 161.8                                                                               | 11.9   | -                                                                                   |                                                                                     |
| HCM Lane LOS             | -                                                                                   | -      | F                                                                                   | B      | -                                                                                   |                                                                                     |
| HCM 95th %ile Q(veh)     | -                                                                                   | -      | 3.5                                                                                 | 0.1    | -                                                                                   |                                                                                     |

12239.00 :: Needham Street  
12: Needham Street & Rockland Street

2025 Build Conditions without Shuttle Service  
Timing Plan: Saturday MIDDAY

| Intersection             |        |       |        |       |      |      |
|--------------------------|--------|-------|--------|-------|------|------|
| Int Delay, s/veh         | 1.4    |       |        |       |      |      |
| Movement                 | WBL    | WBR   | NBT    | NBR   | SBL  | SBT  |
| Lane Configurations      | W      |       |        |       | S    |      |
| Traffic Vol, veh/h       | 15     | 15    | 1100   | 30    | 20   | 895  |
| Future Vol, veh/h        | 15     | 15    | 1100   | 30    | 20   | 895  |
| Conflicting Peds, #/hr   | 0      | 1     | 0      | 18    | 18   | 0    |
| Sign Control             | Stop   | Stop  | Free   | Free  | Free | Free |
| RT Channelized           | -      | None  | -      | None  | -    | None |
| Storage Length           | 0      | -     | -      | -     | 125  | -    |
| Veh in Median Storage, # | 0      | -     | 0      | -     | -    | 0    |
| Grade, %                 | 0      | -     | 0      | -     | -    | 0    |
| Peak Hour Factor         | 92     | 92    | 92     | 92    | 92   | 92   |
| Heavy Vehicles, %        | 0      | 0     | 0      | 0     | 0    | 0    |
| Mvmt Flow                | 16     | 16    | 1196   | 33    | 22   | 973  |
| Major/Minor              |        |       |        |       |      |      |
| Minor1                   | Major1 |       | Major2 |       |      |      |
| Conflicting Flow All     | 2246   | 1231  | 0      | 0     | 1246 | 0    |
| Stage 1                  | 1230   | -     | -      | -     | -    | -    |
| Stage 2                  | 1016   | -     | -      | -     | -    | -    |
| Critical Hdwy            | 6.4    | 6.2   | -      | -     | 4.1  | -    |
| Critical Hdwy Stg 1      | 5.4    | -     | -      | -     | -    | -    |
| Critical Hdwy Stg 2      | 5.4    | -     | -      | -     | -    | -    |
| Follow-up Hdwy           | 3.5    | 3.3   | -      | -     | 2.2  | -    |
| Pot Cap-1 Maneuver       | 47     | 218   | -      | -     | 566  | -    |
| Stage 1                  | 279    | -     | -      | -     | -    | -    |
| Stage 2                  | 353    | -     | -      | -     | -    | -    |
| Platoon blocked, %       | -      | -     | -      | -     | -    | -    |
| Mov Cap-1 Maneuver       | 44     | 215   | -      | -     | 566  | -    |
| Mov Cap-2 Maneuver       | 44     | -     | -      | -     | -    | -    |
| Stage 1                  | 275    | -     | -      | -     | -    | -    |
| Stage 2                  | 339    | -     | -      | -     | -    | -    |
| Approach                 |        |       |        |       |      |      |
| WB                       | NB     |       | SB     |       |      |      |
| HCM Control Delay, s     | 89.2   | 0     | 0.3    |       |      |      |
| HCM LOS                  | F      |       |        |       |      |      |
| Minor Lane/Major Mvmt    |        |       |        |       |      |      |
| NBT                      | NBR    | WBLn1 | SBL    | SBT   |      |      |
| Capacity (veh/h)         | -      | -     | 73     | 566   | -    | -    |
| HCM Lane V/C Ratio       | -      | -     | 0.447  | 0.038 | -    | -    |
| HCM Control Delay (s)    | -      | -     | 89.2   | 11.6  | -    | -    |
| HCM Lane LOS             | -      | -     | F      | B     | -    | -    |
| HCM 95th %tile Q(veh)    | -      | -     | 1.8    | 0.1   | -    | -    |

12239.00 :: Needham Street  
13: Needham Street & Avalon Driveway/Columbia Avenue

2025 Build Conditions without Shuttle Service  
Timing Plan: Saturday MIDDAY

| Lane Group              | EBL   | EBT   | EBR   | WBL   | WBT   | WBR  | NBL   | NBT   | NBR  | SBL   | SBT   | SBR  | Ø1   | Ø3   | Ø5   | Ø7   |
|-------------------------|-------|-------|-------|-------|-------|------|-------|-------|------|-------|-------|------|------|------|------|------|
| Lane Configurations     |       | EBT   | EBR   |       | WBT   | WBR  |       | NBT   | NBR  | SBL   | SBT   | SBR  |      |      |      |      |
| Traffic Volume (vph)    | 10    | 0     | 10    | 10    | 2     | 10   | 10    | 1095  | 10   | 5     | 895   | 5    |      |      |      |      |
| Future Volume (vph)     | 10    | 0     | 10    | 10    | 2     | 10   | 10    | 1095  | 10   | 5     | 895   | 5    |      |      |      |      |
| Ideal Flow (vphpl)      | 1900  | 1900  | 1900  | 1900  | 1900  | 1900 | 1900  | 1900  | 1900 | 1900  | 1900  | 1900 |      |      |      |      |
| Storage Length (ft)     | 0     |       | 50    | 0     | 0     | 125  | 0     | 100   | 0    | 100   | 0     | 0    |      |      |      |      |
| Storage Lanes           | 0     |       | 1     | 0     | 0     | 1    | 0     | 1     | 0    | 1     | 0     | 0    |      |      |      |      |
| Taper Length (ft)       | 25    |       |       | 25    |       |      | 25    |       |      | 25    |       |      |      |      |      |      |
| Satd. Flow (prot)       | 0     | 1805  | 1615  | 0     | 1713  | 0    | 1805  | 1897  | 0    | 1805  | 1898  | 0    |      |      |      |      |
| Flt Permitted           |       |       |       |       | 0.911 |      | 0.228 |       |      | 0.119 |       |      |      |      |      |      |
| Satd. Flow (perm)       | 0     | 1867  | 1615  | 0     | 1596  | 0    | 433   | 1897  | 0    | 226   | 1898  | 0    |      |      |      |      |
| Right Turn on Red       |       | Yes   |       |       | Yes   |      |       | Yes   |      |       | Yes   |      |      |      |      |      |
| Satd. Flow (RTOR)       |       | 80    |       |       | 11    |      |       | 1     |      |       | 1     |      |      |      |      |      |
| Link Speed (mph)        | 30    |       |       | 30    |       |      | 30    |       |      | 30    |       |      |      |      |      |      |
| Link Distance (ft)      | 190   |       |       | 435   |       |      | 338   |       |      | 1135  |       |      |      |      |      |      |
| Travel Time (s)         | 4.3   |       |       | 9.9   |       |      | 7.7   |       |      | 25.8  |       |      |      |      |      |      |
| Confl. Peds. (#/hr)     | 6     |       |       |       | 6     | 11   |       | 12    | 12   |       | 11    |      |      |      |      |      |
| Confl. Bikes (#/hr)     |       |       |       |       |       |      | 2     |       |      |       | 1     |      |      |      |      |      |
| Peak Hour Factor        | 0.92  | 0.92  | 0.92  | 0.92  | 0.92  | 0.92 | 0.92  | 0.92  | 0.92 | 0.92  | 0.92  | 0.92 |      |      |      |      |
| Heavy Vehicles (%)      | 0%    | 0%    | 0%    | 0%    | 0%    | 0%   | 0%    | 0%    | 0%   | 0%    | 0%    | 0%   |      |      |      |      |
| Shared Lane Traffic (%) |       |       |       |       |       |      |       |       |      |       |       |      |      |      |      |      |
| Lane Group Flow (vph)   | 0     | 11    | 11    | 0     | 24    | 0    | 11    | 1201  | 0    | 5     | 978   | 0    |      |      |      |      |
| Turn Type               | Perm  | NA    | Perm  | Perm  | NA    | Perm | NA    | Perm  | NA   | Perm  | NA    |      |      |      |      |      |
| Protected Phases        | 4     |       | 8     |       | 8     |      | 2     |       | 6    |       | 6     |      | 1    | 3    | 5    | 7    |
| Permitted Phases        | 4     |       | 4     | 8     |       | 2    |       | 6     |      | 6     |       |      |      |      |      |      |
| Detector Phase          | 4     | 4     | 4     | 8     | 8     |      | 2     | 2     | 6    | 6     |       |      |      |      |      |      |
| Switch Phase            |       |       |       |       |       |      |       |       |      |       |       |      |      |      |      |      |
| Minimum Initial (s)     | 4.0   | 4.0   | 4.0   | 4.0   | 4.0   |      | 10.0  | 10.0  |      | 10.0  | 10.0  |      | 1.0  | 1.0  | 1.0  | 1.0  |
| Minimum Split (s)       | 19.0  | 19.0  | 19.0  | 22.0  | 22.0  |      | 16.0  | 16.0  |      | 20.0  | 20.0  |      | 3.0  | 3.0  | 3.0  | 3.0  |
| Total Split (s)         | 18.0  | 18.0  | 18.0  | 18.0  | 18.0  |      | 71.0  | 71.0  |      | 71.0  | 71.0  |      | 3.0  | 3.0  | 3.0  | 3.0  |
| Total Split (%)         | 18.9% | 18.9% | 18.9% | 18.9% | 18.9% |      | 74.7% | 74.7% |      | 74.7% | 74.7% |      | 3%   | 3%   | 3%   | 3%   |
| Yellow Time (s)         | 4.0   | 4.0   | 4.0   | 4.0   | 4.0   |      | 4.0   | 4.0   |      | 4.0   | 4.0   |      | 2.0  | 2.0  | 2.0  | 2.0  |
| All-Red Time (s)        | 2.0   | 2.0   | 2.0   | 2.0   | 2.0   |      | 2.0   | 2.0   |      | 2.0   | 2.0   |      | 0.0  | 0.0  | 0.0  | 0.0  |
| Lost Time Adjust (s)    | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   |      | 0.0   | 0.0   |      | 0.0   | 0.0   |      |      |      |      |      |
| Total Lost Time (s)     | 6.0   | 6.0   | 6.0   | 6.0   | 6.0   |      | 6.0   | 6.0   |      | 6.0   | 6.0   |      |      |      |      |      |
| Lead/Lag                | Lag   | Lag   | Lag   | Lag   | Lag   |      | Lag   | Lag   |      | Lag   | Lag   |      | Lead | Lead | Lead | Lead |
| Lead-Lag Optimize?      |       |       |       |       |       |      |       |       |      |       |       |      |      |      |      |      |
| Recall Mode             | None  | None  | None  | None  | None  |      | None  | None  |      | None  | None  |      | None | None | None | None |
| Act Effct Green (s)     | 7.8   | 7.8   | 7.4   |       | 7.4   |      | 52.9  | 52.9  |      | 52.9  | 52.9  |      |      |      |      |      |
| Actuated g/C Ratio      | 0.13  | 0.13  | 0.12  |       | 0.89  |      | 0.89  | 0.89  |      | 0.89  | 0.89  |      |      |      |      |      |
| v/c Ratio               | 0.05  | 0.04  | 0.12  |       | 0.03  |      | 0.71  | 0.71  |      | 0.03  | 0.58  |      |      |      |      |      |
| Control Delay           | 32.6  | 0.3   | 26.4  |       | 4.2   |      | 10.1  | 4.4   |      | 4.4   | 6.8   |      |      |      |      |      |
| Queue Delay             | 0.0   | 0.0   | 0.0   |       | 0.0   |      | 0.0   | 0.0   |      | 0.0   | 0.0   |      |      |      |      |      |
| Total Delay             | 32.6  | 0.3   | 26.4  |       | 4.2   |      | 10.1  | 4.4   |      | 4.4   | 6.8   |      |      |      |      |      |
| LOS                     | C     | A     | C     |       | A     |      | B     | A     |      | A     | A     |      |      |      |      |      |
| Approach Delay          | 16.5  |       | 26.4  |       |       |      | 10.0  |       |      |       | 6.8   |      |      |      |      |      |
| Approach LOS            | B     |       | C     |       |       |      | B     |       |      | A     |       |      |      |      |      |      |
| Queue Length 50th (ft)  | 4     | 0     | 4     |       | 0     |      | 0     | 0     |      | 0     | 0     |      |      |      |      |      |
| Queue Length 95th (ft)  | 21    | 0     | 31    |       | 9     |      | #1018 |       |      | 5     | 579   |      |      |      |      |      |
| Internal Link Dist (ft) | 110   |       | 355   |       |       |      | 258   |       |      |       | 1055  |      |      |      |      |      |
| Turn Bay Length (ft)    |       | 50    |       |       | 125   |      |       | 100   |      |       |       |      |      |      |      |      |
| Base Capacity (vph)     | 499   | 490   | 425   |       | 386   |      | 1692  | 201   |      | 1693  |       |      |      |      |      |      |
| Starvation Cap Reductn  | 0     | 0     | 0     |       | 0     |      | 0     | 0     |      | 0     | 0     |      |      |      |      |      |
| Spillback Cap Reductn   | 0     | 0     | 0     |       | 0     |      | 0     | 0     |      | 0     | 0     |      |      |      |      |      |
| Storage Cap Reductn     | 0     | 0     | 0     |       | 0     |      | 0     | 0     |      | 0     | 0     |      |      |      |      |      |
| Reduced v/c Ratio       | 0.02  | 0.02  | 0.06  |       | 0.03  |      | 0.71  |       |      | 0.02  | 0.58  |      |      |      |      |      |

| Intersection Summary                                            |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|-----------------------------------------------------------------|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|
| Area Type: Other                                                |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Cycle Length: 95                                                |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Actuated Cycle Length: 59.7                                     |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Natural Cycle: 90                                               |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Control Type: Actuated-Uncoordinated                            |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Maximum v/c Ratio: 0.71                                         |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Intersection Signal Delay: 8.8                                  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Intersection Capacity Utilization 77.4%                         |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Analysis Period (min) 15                                        |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| # 95th percentile volume exceeds capacity, queue may be longer. |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Queue shown is maximum after two cycles.                        |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |

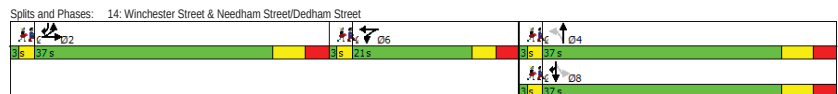


12239.00 :: Needham Street  
14: Winchester Street & Needham Street/Dedham Street

2025 Build Conditions without Shuttle Service  
Timing Plan: Saturday MIDDAY

| Lane Group              | EBL   | EBT   | EBR  | WBL  | WBT   | WBR   | NBL   | NBT   | NBR   | SBL  | SBT   | SBR   | Ø1    | Ø3   | Ø5   | Ø7   |
|-------------------------|-------|-------|------|------|-------|-------|-------|-------|-------|------|-------|-------|-------|------|------|------|
| Lane Configurations     | ↔     | ↔     |      | ↔    | ↔     | ↔     | ↔     | ↔     | ↔     | ↔    | ↔     | ↔     |       |      |      |      |
| Traffic Volume (vph)    | 875   | 155   | 90   | 20   | 155   | 90    | 55    | 220   | 10    | 50   | 215   | 700   |       |      |      |      |
| Future Volume (vph)     | 875   | 155   | 90   | 20   | 155   | 90    | 55    | 220   | 10    | 50   | 215   | 700   |       |      |      |      |
| Ideal Flow (vphpl)      | 1900  | 1900  | 1900 | 1900 | 1900  | 1900  | 1900  | 1900  | 1900  | 1900 | 1900  | 1900  |       |      |      |      |
| Storage Length (ft)     | 340   |       | 75   | 0    |       | 0     | 100   |       | 0     | 0    |       | 0     |       |      |      |      |
| Storage Lanes           | 1     |       | 1    | 0    |       | 0     | 1     |       | 0     | 0    |       | 1     |       |      |      |      |
| Taper Length (ft)       | 25    |       | 25   |      |       | 25    |       |       | 25    |      |       | 25    |       |      |      |      |
| Satd. Flow (prot)       | 3502  | 1765  | 0    | 0    | 1786  | 0     | 1805  | 1883  | 0     | 0    | 1864  | 1599  |       |      |      |      |
| Flt Permitted           | 0.950 |       |      |      | 0.996 |       | 0.443 |       |       |      | 0.782 |       |       |      |      |      |
| Satd. Flow (perm)       | 3427  | 1765  | 0    | 0    | 1784  | 0     | 838   | 1883  | 0     | 0    | 1468  | 1599  |       |      |      |      |
| Right Turn on Red       |       |       | Yes  |      |       | Yes   |       | No    |       |      | Yes   |       |       |      |      |      |
| Satd. Flow (RTOR)       |       | 28    |      |      | 21    |       |       |       |       |      | 353   |       |       |      |      |      |
| Link Speed (mph)        |       | 30    |      |      | 30    |       |       | 30    |       |      | 30    |       |       |      |      |      |
| Link Distance (ft)      |       | 1135  |      |      | 451   |       |       | 634   |       |      | 722   |       |       |      |      |      |
| Travel Time (s)         |       | 25.8  |      |      | 10.3  |       |       | 14.4  |       |      | 16.4  |       |       |      |      |      |
| Confl. Peds. (#/hr)     | 8     |       | 4    | 4    |       | 8     | 4     |       | 5     | 5    |       | 4     |       |      |      |      |
| Confl. Bikes (#/hr)     |       |       |      |      |       |       |       | 1     |       |      |       | 1     |       |      |      |      |
| Peak Hour Factor        | 0.92  | 0.92  | 0.92 | 0.92 | 0.92  | 0.92  | 0.92  | 0.92  | 0.92  | 0.92 | 0.92  | 0.92  |       |      |      |      |
| Heavy Vehicles (%)      | 0%    | 0%    | 0%   | 0%   | 0%    | 0%    | 0%    | 0%    | 0%    | 1%   | 1%    | 1%    |       |      |      |      |
| Shared Lane Traffic (%) |       |       |      |      |       |       |       |       |       |      |       |       |       |      |      |      |
| Lane Group Flow (vph)   | 951   | 266   | 0    | 0    | 288   | 0     | 60    | 250   | 0     | 0    | 288   | 761   |       |      |      |      |
| Turn Type               | Split | NA    |      |      | Split | NA    |       | Perm  | NA    |      | Perm  | NA    | pt+ov |      |      |      |
| Protected Phases        | 2     | 2     |      |      | 6     | 6     |       | 4     |       |      | 8     | 2 8   | 1     | 3    | 5    | 7    |
| Permitted Phases        |       |       |      |      |       |       | 4     |       |       |      | 8     |       |       |      |      |      |
| Detector Phase          | 2     | 2     |      |      | 6     | 6     |       | 4     | 4     |      | 8     | 8     | 2 8   |      |      |      |
| Switch Phase            |       |       |      |      |       |       |       |       |       |      |       |       |       |      |      |      |
| Minimum Initial (s)     | 10.0  | 10.0  |      |      | 6.0   | 6.0   |       | 6.0   | 6.0   |      | 6.0   | 6.0   | 1.0   | 1.0  | 1.0  | 1.0  |
| Minimum Split (s)       | 17.0  | 17.0  |      |      | 19.0  | 19.0  |       | 20.0  | 20.0  |      | 36.0  | 36.0  | 3.0   | 3.0  | 3.0  | 3.0  |
| Total Split (s)         | 37.0  | 37.0  |      |      | 21.0  | 21.0  |       | 37.0  | 37.0  |      | 37.0  | 37.0  | 3.0   | 3.0  | 3.0  | 3.0  |
| Total Split (%)         | 35.6% | 35.6% |      |      | 20.2% | 20.2% |       | 35.6% | 35.6% |      | 35.6% | 35.6% | 3%    | 3%   | 3%   | 3%   |
| Yellow Time (s)         | 4.0   | 4.0   |      |      | 3.0   | 3.0   |       | 4.0   | 4.0   |      | 4.0   | 4.0   | 2.0   | 2.0  | 2.0  | 2.0  |
| All-Red Time (s)        | 3.0   | 3.0   |      |      | 3.0   | 3.0   |       | 3.0   | 3.0   |      | 3.0   | 3.0   | 0.0   | 0.0  | 0.0  | 0.0  |
| Lost Time Adjust (s)    | 0.0   | 0.0   |      |      | 0.0   | 0.0   |       | 0.0   | 0.0   |      | 0.0   | 0.0   |       |      |      |      |
| Total Lost Time (s)     | 7.0   | 7.0   |      |      | 6.0   | 7.0   |       | 7.0   | 7.0   |      | 7.0   | 7.0   |       |      |      |      |
| Lead/Lag                | Lag   | Lag   |      |      | Lag   | Lag   |       | Lag   | Lag   |      | Lag   | Lag   | Lead  | Lead | Lead | Lead |
| Lead-Lag Optimize?      |       |       |      |      |       |       |       |       |       |      |       |       |       |      |      |      |
| Recall Mode             | None  | None  |      |      | None  | None  |       | None  | None  |      | None  | None  | None  | None | None | None |
| Act Effect Green (s)    | 29.6  | 29.6  |      |      | 15.2  | 22.2  |       | 22.2  | 22.2  |      | 57.6  |       |       |      |      |      |
| Actuated g/C Ratio      | 0.33  | 0.33  |      |      | 0.17  | 0.25  |       | 0.25  | 0.25  |      | 0.25  | 0.65  |       |      |      |      |
| v/c Ratio               | 0.81  | 0.44  |      |      | 0.89  | 0.29  |       | 0.53  | 0.78  |      | 0.65  |       |       |      |      |      |
| Control Delay           | 35.4  | 25.1  |      |      | 66.1  | 31.1  |       | 33.3  | 47.1  |      | 7.4   |       |       |      |      |      |
| Queue Delay             | 0.0   | 0.0   |      |      | 0.0   | 0.0   |       | 0.0   | 0.0   |      | 0.0   |       |       |      |      |      |
| Total Delay             | 35.4  | 25.1  |      |      | 66.1  | 31.1  |       | 33.3  | 47.1  |      | 7.4   |       |       |      |      |      |
| LOS                     | D     | C     |      |      | E     | C     |       | C     | D     |      | A     |       |       |      |      |      |
| Approach Delay          |       | 33.1  |      |      | 66.1  |       |       | 32.9  | 18.3  |      |       |       |       |      |      |      |
| Approach LOS            |       | C     |      |      | E     |       |       | C     | B     |      |       |       |       |      |      |      |
| Queue Length 50th (ft)  | 243   | 100   |      |      | 147   |       |       | 118   | 147   |      | 91    |       |       |      |      |      |
| Queue Length 95th (ft)  | #443  | 212   |      |      | #365  |       |       | 212   | 266   |      | 230   |       |       |      |      |      |
| Internal Link Dist (ft) |       | 1055  |      |      | 371   |       |       | 554   | 642   |      |       |       |       |      |      |      |
| Turn Bay Length (ft)    | 340   |       |      |      |       |       |       | 100   |       |      |       |       |       |      |      |      |
| Base Capacity (vph)     | 1198  | 622   |      |      | 322   |       |       | 286   | 644   |      | 502   | 1160  |       |      |      |      |
| Starvation Cap Reductn  | 0     | 0     |      |      | 0     | 0     | 0     | 0     | 0     |      | 0     | 0     |       |      |      |      |
| Spillback Cap Reductn   | 0     | 0     |      |      | 0     | 0     | 0     | 0     | 0     |      | 0     | 0     |       |      |      |      |
| Storage Cap Reductn     | 0     | 0     |      |      | 0     | 0     | 0     | 0     | 0     |      | 0     | 0     |       |      |      |      |
| Reduced v/c Ratio       | 0.79  | 0.43  |      |      | 0.89  |       |       | 0.21  | 0.39  |      | 0.57  | 0.66  |       |      |      |      |

| Intersection Summary                                            |                        |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|-----------------------------------------------------------------|------------------------|--|--|--|--|--|--|--|--|--|--|--|--|--|--|
| Area Type:                                                      | Other                  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Cycle Length:                                                   | 104                    |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Actuated Cycle Length:                                          | 88.7                   |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Natural Cycle:                                                  | 95                     |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Control Type:                                                   | Actuated-Uncoordinated |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Maximum v/c Ratio:                                              | 0.89                   |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Intersection Signal Delay:                                      | 31.0                   |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Intersection Capacity Utilization                               | 90.0%                  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| ICU Level of Service                                            | E                      |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Analysis Period (min)                                           | 15                     |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| # 95th percentile volume exceeds capacity, queue may be longer. |                        |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| # Queue shown is maximum after two cycles.                      |                        |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| m Queue shown is maximum after two cycles.                      |                        |  |  |  |  |  |  |  |  |  |  |  |  |  |  |



12239.00 :: Needham Street  
15: Winchester Street & Route 9 EB Access Road

2025 Build Conditions without Shuttle Service  
Timing Plan: Saturday MIDDAY

|                         |  |  |  |  |  |  |      |      |      |      |      |
|-------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|------|------|------|------|------|
| Lane Group              | WBL                                                                                 | WBR                                                                                 | NBT                                                                                 | NBR                                                                                 | SBL                                                                                 | SBT                                                                                 | Ø2   | Ø3   | Ø4   | Ø5   | Ø6   |
| Lane Configurations     |  |  |  |  |  |  |      |      |      |      |      |
| Traffic Volume (vph)    | 105                                                                                 | 200                                                                                 | 840                                                                                 | 340                                                                                 | 140                                                                                 | 870                                                                                 |      |      |      |      |      |
| Future Volume (vph)     | 105                                                                                 | 200                                                                                 | 840                                                                                 | 340                                                                                 | 140                                                                                 | 870                                                                                 |      |      |      |      |      |
| Ideal Flow (vphpl)      | 1900                                                                                | 1900                                                                                | 1900                                                                                | 1900                                                                                | 1900                                                                                | 1900                                                                                |      |      |      |      |      |
| Storage Length (ft)     | 200                                                                                 | 0                                                                                   |                                                                                     | 100                                                                                 | 0                                                                                   |                                                                                     |      |      |      |      |      |
| Storage Lanes           | 1                                                                                   | 1                                                                                   |                                                                                     | 1                                                                                   | 1                                                                                   |                                                                                     |      |      |      |      |      |
| Taper Length (ft)       | 25                                                                                  |                                                                                     |                                                                                     |                                                                                     | 25                                                                                  |                                                                                     |      |      |      |      |      |
| Satd. Flow (prot)       | 1805                                                                                | 1615                                                                                | 1900                                                                                | 1615                                                                                | 1805                                                                                | 1900                                                                                |      |      |      |      |      |
| Flt Permitted           | 0.950                                                                               |                                                                                     |                                                                                     |                                                                                     | 0.073                                                                               |                                                                                     |      |      |      |      |      |
| Satd. Flow (perm)       | 1805                                                                                | 1615                                                                                | 1900                                                                                | 1576                                                                                | 139                                                                                 | 1900                                                                                |      |      |      |      |      |
| Right Turn on Red       |                                                                                     | Yes                                                                                 |                                                                                     | Yes                                                                                 |                                                                                     |                                                                                     |      |      |      |      |      |
| Satd. Flow (RTOR)       |                                                                                     | 157                                                                                 |                                                                                     | 97                                                                                  |                                                                                     |                                                                                     |      |      |      |      |      |
| Link Speed (mph)        | 30                                                                                  |                                                                                     | 30                                                                                  |                                                                                     | 30                                                                                  |                                                                                     |      |      |      |      |      |
| Link Distance (ft)      | 443                                                                                 |                                                                                     | 400                                                                                 |                                                                                     | 252                                                                                 |                                                                                     |      |      |      |      |      |
| Travel Time (s)         | 10.1                                                                                |                                                                                     | 9.1                                                                                 |                                                                                     | 5.7                                                                                 |                                                                                     |      |      |      |      |      |
| Confl. Peds. (#/hr)     |                                                                                     |                                                                                     |                                                                                     | 1                                                                                   | 1                                                                                   |                                                                                     |      |      |      |      |      |
| Peak Hour Factor        | 0.92                                                                                | 0.92                                                                                | 0.92                                                                                | 0.92                                                                                | 0.92                                                                                | 0.92                                                                                |      |      |      |      |      |
| Heavy Vehicles (%)      | 0%                                                                                  | 0%                                                                                  | 0%                                                                                  | 0%                                                                                  | 0%                                                                                  | 0%                                                                                  |      |      |      |      |      |
| Shared Lane Traffic (%) |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |      |      |      |      |      |
| Lane Group Flow (vph)   | 114                                                                                 | 217                                                                                 | 913                                                                                 | 370                                                                                 | 152                                                                                 | 946                                                                                 |      |      |      |      |      |
| Turn Type               | Prot                                                                                | custom                                                                              | NA                                                                                  | custom                                                                              | custom                                                                              | NA                                                                                  |      |      |      |      |      |
| Protected Phases        | 5 6                                                                                 | 1 5 6                                                                               | 2 3                                                                                 | 5 6                                                                                 | 1                                                                                   | 1 2 3 4                                                                             | 2    | 3    | 4    | 5    | 6    |
| Permitted Phases        |                                                                                     |                                                                                     |                                                                                     |                                                                                     | 2                                                                                   | 2                                                                                   |      |      |      |      |      |
| Detector Phase          | 5 6                                                                                 | 1 5 6                                                                               | 2 3                                                                                 | 5 6                                                                                 | 1                                                                                   | 1 2 3 4                                                                             |      |      |      |      |      |
| Switch Phase            |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |      |      |      |      |      |
| Minimum Initial (s)     |                                                                                     |                                                                                     |                                                                                     |                                                                                     | 4.0                                                                                 |                                                                                     | 10.0 | 10.0 | 4.0  | 4.0  | 4.0  |
| Minimum Split (s)       |                                                                                     |                                                                                     |                                                                                     |                                                                                     | 10.0                                                                                |                                                                                     | 25.0 | 27.0 | 10.0 | 11.0 | 9.0  |
| Total Split (s)         |                                                                                     |                                                                                     |                                                                                     |                                                                                     | 23.0                                                                                |                                                                                     | 61.0 | 28.0 | 10.0 | 27.0 | 9.0  |
| Total Split (%)         |                                                                                     |                                                                                     |                                                                                     |                                                                                     | 14.6%                                                                               |                                                                                     | 39%  | 18%  | 6%   | 17%  | 6%   |
| Yellow Time (s)         |                                                                                     |                                                                                     |                                                                                     |                                                                                     | 4.0                                                                                 |                                                                                     | 4.0  | 4.0  | 4.0  | 3.0  | 3.0  |
| All-Red Time (s)        |                                                                                     |                                                                                     |                                                                                     |                                                                                     | 2.0                                                                                 |                                                                                     | 2.0  | 2.0  | 2.0  | 4.0  | 2.0  |
| Lost Time Adjust (s)    |                                                                                     |                                                                                     |                                                                                     |                                                                                     | 0.0                                                                                 |                                                                                     |      |      |      |      |      |
| Total Lost Time (s)     |                                                                                     |                                                                                     |                                                                                     |                                                                                     | 6.0                                                                                 |                                                                                     |      |      |      |      |      |
| Lead/Lag                |                                                                                     |                                                                                     |                                                                                     |                                                                                     | Lead                                                                                |                                                                                     | Lag  | Lead | Lag  | Lead | Lag  |
| Lead-Lag Optimize?      |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |      |      |      |      |      |
| Recall Mode             |                                                                                     |                                                                                     |                                                                                     |                                                                                     | None                                                                                |                                                                                     | None | None | None | None | None |
| Act Effect Green (s)    | 29.0                                                                                | 53.0                                                                                | 83.0                                                                                | 83.0                                                                                | 72.0                                                                                | 116.0                                                                               |      |      |      |      |      |
| Actuated g/C Ratio      | 0.18                                                                                | 0.34                                                                                | 0.53                                                                                | 0.53                                                                                | 0.46                                                                                | 0.73                                                                                |      |      |      |      |      |
| v/c Ratio               | 0.34                                                                                | 0.34                                                                                | 0.91                                                                                | 0.42                                                                                | 0.63                                                                                | 0.68                                                                                |      |      |      |      |      |
| Control Delay           | 59.6                                                                                | 12.9                                                                                | 49.0                                                                                | 10.0                                                                                | 51.3                                                                                | 6.8                                                                                 |      |      |      |      |      |
| Queue Delay             | 0.0                                                                                 | 1.0                                                                                 | 11.5                                                                                | 0.0                                                                                 | 0.0                                                                                 | 43.1                                                                                |      |      |      |      |      |
| Total Delay             | 59.6                                                                                | 13.9                                                                                | 60.4                                                                                | 10.0                                                                                | 51.3                                                                                | 49.9                                                                                |      |      |      |      |      |
| LOS                     | E                                                                                   | B                                                                                   | E                                                                                   | B                                                                                   | D                                                                                   | D                                                                                   |      |      |      |      |      |
| Approach Delay          | 29.6                                                                                |                                                                                     | 45.9                                                                                |                                                                                     |                                                                                     | 50.1                                                                                |      |      |      |      |      |
| Approach LOS            | C                                                                                   |                                                                                     | D                                                                                   |                                                                                     |                                                                                     | D                                                                                   |      |      |      |      |      |
| Queue Length 50th (ft)  | 104                                                                                 | 43                                                                                  | 842                                                                                 | 91                                                                                  | 118                                                                                 | 220                                                                                 |      |      |      |      |      |
| Queue Length 95th (ft)  | 169                                                                                 | 113                                                                                 | #1147                                                                               | 137                                                                                 | m117                                                                                | m216                                                                                |      |      |      |      |      |
| Internal Link Dist (ft) | 363                                                                                 |                                                                                     | 320                                                                                 |                                                                                     |                                                                                     | 172                                                                                 |      |      |      |      |      |
| Turn Bay Length (ft)    | 200                                                                                 |                                                                                     |                                                                                     | 100                                                                                 |                                                                                     |                                                                                     |      |      |      |      |      |
| Base Capacity (vph)     | 331                                                                                 | 646                                                                                 | 998                                                                                 | 881                                                                                 | 242                                                                                 | 1394                                                                                |      |      |      |      |      |
| Starvation Cap Reductn  | 0                                                                                   | 0                                                                                   | 31                                                                                  | 0                                                                                   | 0                                                                                   | 520                                                                                 |      |      |      |      |      |
| Spillback Cap Reductn   | 0                                                                                   | 230                                                                                 | 86                                                                                  | 0                                                                                   | 0                                                                                   | 0                                                                                   |      |      |      |      |      |
| Storage Cap Reductn     | 0                                                                                   | 0                                                                                   | 0                                                                                   | 0                                                                                   | 0                                                                                   | 0                                                                                   |      |      |      |      |      |
| Reduced v/c Ratio       | 0.34                                                                                | 0.52                                                                                | 1.00                                                                                | 0.42                                                                                | 0.63                                                                                | 1.08                                                                                |      |      |      |      |      |

2025 Build Conditions without Shuttle Service

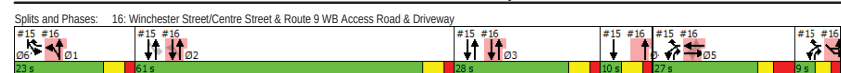
Timing Plan: Saturday Midday

| Intersection Summary                                                                                                                                                                                                                                                                                             |                        |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------|
| Area Type:                                                                                                                                                                                                                                                                                                       | Other                  |
| Cycle Length:                                                                                                                                                                                                                                                                                                    | 158                    |
| Actuated Cycle Length:                                                                                                                                                                                                                                                                                           | 158                    |
| Natural Cycle:                                                                                                                                                                                                                                                                                                   | 145                    |
| Control Type:                                                                                                                                                                                                                                                                                                    | Actuated-Uncoordinated |
| Maximum v/c Ratio:                                                                                                                                                                                                                                                                                               | 1.10                   |
| Intersection Signal Delay:                                                                                                                                                                                                                                                                                       | 66.0                   |
| Intersection Capacity Utilization:                                                                                                                                                                                                                                                                               | 100.8%                 |
| Analysis Period (min):                                                                                                                                                                                                                                                                                           | 15                     |
| <p>Volume exceeds capacity, queue is theoretically infinite.</p> <p>Queue shown is maximum after two cycles.</p> <p># 95th percentile volume exceeds capacity, queue may be longer.</p> <p>Queue shown is maximum after two cycles.</p> <p>m Volume for 95th percentile queue is metered by upstream signal.</p> |                        |
| Intersection LOS:                                                                                                                                                                                                                                                                                                | E                      |
| ICU Level of Service:                                                                                                                                                                                                                                                                                            | G                      |

\\vhb\proj\Wat-LD\12239.00\tech\Traffic\Synchro\TIA\_2018\2025 BD\_SAT\_CONSERVATIVE.syn  
07/03/2018

2025 Build Conditions without Shuttle Service

Timing Plan: Saturday Midday

\\vhb\proj\Wat-LD\12239.00\tech\Traffic\Synchro\TIA\_2018\2025 BD\_SAT\_CONSERVATIVE.syn  
07/03/2018

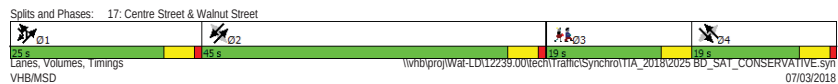


12239.00 :: Needham Street  
17: Centre Street & Walnut Street

2025 Build Conditions without Shuttle Service  
Timing Plan: Saturday Midday

| Lane Group              | SEL   | SET   | SER   | NWL   | NWT   | NWR   | NEL   | NET  | NER  | SWL   | SWR   | Ø3   |
|-------------------------|-------|-------|-------|-------|-------|-------|-------|------|------|-------|-------|------|
| Lane Configurations     |       |       |       |       |       |       |       |      |      |       |       |      |
| Traffic Volume (vph)    | 30    | 10    | 385   | 40    | 95    | 5     | 460   | 385  | 10   | 5     | 475   | 65   |
| Future Volume (vph)     | 30    | 10    | 385   | 40    | 95    | 5     | 460   | 385  | 10   | 5     | 475   | 65   |
| Ideal Flow (vphpl)      | 1900  | 1900  | 1900  | 1900  | 1900  | 1900  | 1900  | 1900 | 1900 | 1900  | 1900  | 1900 |
| Storage Length (ft)     | 0     |       | 50    | 0     |       | 0     | 75    | 0    |      | 0     | 0     | 0    |
| Storage Lanes           | 0     |       | 1     | 0     |       | 0     | 1     | 0    |      | 0     | 0     | 0    |
| Taper Length (ft)       | 25    |       |       | 25    |       |       | 25    |      |      | 25    |       | 0    |
| Satd. Flow (prot)       | 0     | 1813  | 1599  | 0     | 1864  | 0     | 1805  | 1891 | 0    | 0     | 1863  | 0    |
| Flt Permitted           |       | 0.573 |       |       | 0.888 |       | 0.296 |      |      | 0.997 |       |      |
| Satd. Flow (perm)       | 0     | 1071  | 1557  | 0     | 1672  | 0     | 562   | 1891 | 0    | 0     | 1858  | 0    |
| Right Turn on Red       |       |       | No    |       | No    |       |       | Yes  |      |       | Yes   |      |
| Satd. Flow (RTOR)       |       |       |       |       |       |       | 2     |      |      | 7     |       |      |
| Link Speed (mph)        |       | 30    |       |       | 30    |       |       | 30   |      |       | 30    |      |
| Link Distance (ft)      |       | 624   |       |       | 387   |       |       | 508  |      |       | 531   |      |
| Travel Time (s)         |       | 14.2  |       |       | 8.8   |       |       | 11.5 |      |       | 12.1  |      |
| Confl. Peds. (#/hr)     | 4     |       | 4     | 4     |       | 4     | 4     |      | 3    | 3     |       | 4    |
| Confl. Bikes (#/hr)     |       |       |       |       |       |       |       |      |      |       |       | 2    |
| Peak Hour Factor        | 0.92  | 0.92  | 0.92  | 0.92  | 0.92  | 0.92  | 0.92  | 0.92 | 0.92 | 0.92  | 0.92  | 0.92 |
| Heavy Vehicles (%)      | 1%    | 1%    | 1%    | 0%    | 0%    | 0%    | 0%    | 0%   | 0%   | 0%    | 0%    | 0%   |
| Shared Lane Traffic (%) |       |       |       |       |       |       |       |      |      |       |       |      |
| Lane Group Flow (vph)   | 0     | 44    | 418   | 0     | 151   | 0     | 500   | 429  | 0    | 0     | 592   | 0    |
| Turn Type               | Perm  | NA    | pm+ov | Perm  | NA    | D,P+P | NA    | Perm | NA   | NA    | 0     |      |
| Protected Phases        |       | 4     | 1     |       | 4     |       | 1     | 12   |      |       | 2     | 3    |
| Permitted Phases        | 4     |       | 4     | 4     |       |       | 2     |      |      | 2     |       |      |
| Detector Phase          | 4     | 4     | 1     | 4     | 4     |       | 1     | 12   |      | 2     | 2     |      |
| Switch Phase            |       |       |       |       |       |       |       |      |      |       |       |      |
| Minimum Initial (s)     | 9.0   | 9.0   | 7.0   | 9.0   | 9.0   |       | 7.0   |      |      | 6.0   | 6.0   | 4.0  |
| Minimum Split (s)       | 14.0  | 14.0  | 12.0  | 14.0  | 14.0  |       | 12.0  |      |      | 11.0  | 11.0  | 19.0 |
| Total Split (s)         | 19.0  | 19.0  | 25.0  | 19.0  | 19.0  |       | 25.0  |      |      | 45.0  | 45.0  | 19.0 |
| Total Split (%)         | 17.6% | 17.6% | 23.1% | 17.6% | 17.6% |       | 23.1% |      |      | 41.7% | 41.7% | 18%  |
| Yellow Time (s)         | 4.0   | 4.0   | 4.0   | 4.0   | 4.0   |       | 4.0   |      |      | 4.0   | 4.0   | 4.0  |
| All-Red Time (s)        | 1.0   | 1.0   | 1.0   | 1.0   | 1.0   |       | 1.0   |      |      | 1.0   | 1.0   | 0.0  |
| Lost Time Adjust (s)    |       | 0.0   | 0.0   |       | 0.0   |       | 0.0   |      |      | 0.0   |       |      |
| Total Lost Time (s)     |       | 5.0   | 5.0   |       | 5.0   |       | 5.0   |      |      | 5.0   |       |      |
| Lead/Lag                | Lag   | Lag   | Lead  | Lag   | Lag   |       | Lead  |      |      | Lag   | Lag   | Lead |
| Lead-Lag Optimize?      |       |       |       |       |       |       |       |      |      |       |       |      |
| Recall Mode             | Min   | Min   | Max   | Min   | Min   |       | Max   |      |      | Max   | Max   | None |
| Act Effct Green (s)     | 12.0  | 32.2  |       | 12.0  |       |       | 60.8  | 65.8 |      |       | 40.5  |      |
| Actuated g/C Ratio      | 0.13  | 0.34  |       | 0.13  |       |       | 0.64  | 0.70 |      |       | 0.43  |      |
| v/c Ratio               | 0.33  | 0.78  |       | 0.71  |       |       | 0.80  | 0.33 |      |       | 0.74  |      |
| Control Delay           | 47.4  | 38.7  |       | 60.8  |       |       | 22.9  | 8.3  |      |       | 31.7  |      |
| Queue Delay             | 0.0   | 0.0   |       | 0.0   |       |       | 0.2   | 0.5  |      |       | 0.0   |      |
| Total Delay             | 47.4  | 38.7  |       | 60.8  |       |       | 23.2  | 8.8  |      |       | 31.7  |      |
| LOS                     |       | D     |       | E     |       |       | C     | A    |      |       | C     |      |
| Approach Delay          |       | 38.6  |       | 60.8  |       |       | 16.5  |      |      | 31.7  |       |      |
| Approach LOS            |       | D     |       | E     |       |       | B     |      |      | C     |       |      |
| Queue Length 50th (ft)  |       | 22    | 173   |       | 80    |       | 80    | 64   |      |       | 247   |      |
| Queue Length 95th (ft)  |       | 64    | #437  |       | #192  |       | #381  | 205  |      |       | #568  |      |
| Internal Link Dist (ft) |       | 544   |       | 307   |       |       | 428   |      |      | 451   |       |      |
| Turn Bay Length (ft)    |       |       | 50    |       |       |       | 75    |      |      |       |       |      |
| Base Capacity (vph)     |       | 160   | 539   |       | 250   |       | 627   | 1316 |      |       | 799   |      |
| Starvation Cap Reductn  |       | 0     | 0     |       | 0     |       | 8     | 494  |      |       | 0     |      |
| Spillback Cap Reductn   |       | 0     | 0     |       | 0     |       | 0     | 0    |      |       | 0     |      |
| Storage Cap Reductn     |       | 0     | 0     |       | 0     |       | 0     | 0    |      |       | 0     |      |
| Reduced v/c Ratio       |       | 0.28  | 0.78  |       | 0.60  |       | 0.81  | 0.52 |      |       | 0.74  |      |

| Intersection Summary              |                                                               |                        |
|-----------------------------------|---------------------------------------------------------------|------------------------|
| Area Type:                        | Other                                                         |                        |
| Cycle Length:                     | 108                                                           |                        |
| Actuated Cycle Length:            | 94.6                                                          |                        |
| Natural Cycle:                    | 90                                                            |                        |
| Control Type:                     | Semi Act-Uncoord                                              |                        |
| Maximum v/c Ratio:                | 0.80                                                          |                        |
| Intersection Signal Delay:        | 28.9                                                          | Intersection LOS: C    |
| Intersection Capacity Utilization | 81.5%                                                         | ICU Level of Service D |
| Analysis Period (min)             | 15                                                            |                        |
| #                                 | 95th percentile volume exceeds capacity, queue may be longer. |                        |
|                                   | Queue shown is maximum after two cycles.                      |                        |



12239.00 :: Needham Street  
18: Nahanton Street & Winchester Street

2025 Build Conditions without Shuttle Service  
Timing Plan: Saturday Midday

|                         |  |  |  |  |  |  |
|-------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
| Lane Group              | EBL                                                                                 | EBT                                                                                 | WBT                                                                                 | WBR                                                                                 | SBL                                                                                 | SBR                                                                                 |
| Lane Configurations     |  |  |                                                                                     |                                                                                     |  |  |
| Traffic Volume (vph)    | 275                                                                                 | 470                                                                                 | 505                                                                                 | 85                                                                                  | 100                                                                                 | 300                                                                                 |
| Future Volume (vph)     | 275                                                                                 | 470                                                                                 | 505                                                                                 | 85                                                                                  | 100                                                                                 | 300                                                                                 |
| Ideal Flow (vphpl)      | 1900                                                                                | 1900                                                                                | 1900                                                                                | 1900                                                                                | 1900                                                                                | 1900                                                                                |
| Storage Length (ft)     | 175                                                                                 |                                                                                     |                                                                                     | 0                                                                                   | 75                                                                                  | 0                                                                                   |
| Storage Lanes           | 1                                                                                   |                                                                                     |                                                                                     | 0                                                                                   | 1                                                                                   | 1                                                                                   |
| Taper Length (ft)       | 25                                                                                  |                                                                                     |                                                                                     |                                                                                     | 25                                                                                  |                                                                                     |
| Satd. Flow (prot)       | 1805                                                                                | 1900                                                                                | 1855                                                                                | 0                                                                                   | 1805                                                                                | 1615                                                                                |
| Flt Permitted           | 0.229                                                                               |                                                                                     |                                                                                     |                                                                                     | 0.950                                                                               |                                                                                     |
| Satd. Flow (perm)       | 435                                                                                 | 1900                                                                                | 1855                                                                                | 0                                                                                   | 1805                                                                                | 1615                                                                                |
| Right Turn on Red       |                                                                                     |                                                                                     |                                                                                     | Yes                                                                                 |                                                                                     | No                                                                                  |
| Satd. Flow (RTOR)       |                                                                                     |                                                                                     | 14                                                                                  |                                                                                     |                                                                                     |                                                                                     |
| Link Speed (mph)        |                                                                                     | 30                                                                                  | 30                                                                                  |                                                                                     | 30                                                                                  |                                                                                     |
| Link Distance (ft)      |                                                                                     | 963                                                                                 | 734                                                                                 |                                                                                     | 889                                                                                 |                                                                                     |
| Travel Time (s)         |                                                                                     | 21.9                                                                                | 16.7                                                                                |                                                                                     | 20.2                                                                                |                                                                                     |
| Confl. Peds. (#/hr)     | 1                                                                                   |                                                                                     |                                                                                     | 1                                                                                   |                                                                                     |                                                                                     |
| Confl. Bikes (#/hr)     |                                                                                     |                                                                                     |                                                                                     | 13                                                                                  |                                                                                     |                                                                                     |
| Peak Hour Factor        | 0.92                                                                                | 0.92                                                                                | 0.92                                                                                | 0.92                                                                                | 0.92                                                                                | 0.92                                                                                |
| Heavy Vehicles (%)      | 0%                                                                                  | 0%                                                                                  | 0%                                                                                  | 0%                                                                                  | 0%                                                                                  | 0%                                                                                  |
| Shared Lane Traffic (%) |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Lane Group Flow (vph)   | 299                                                                                 | 511                                                                                 | 641                                                                                 | 0                                                                                   | 109                                                                                 | 326                                                                                 |
| Turn Type               | pm+pt                                                                               | NA                                                                                  | NA                                                                                  | Prot                                                                                | pt+ov                                                                               |                                                                                     |
| Protected Phases        | 5                                                                                   | 2                                                                                   | 6                                                                                   |                                                                                     | 8                                                                                   | 5 8                                                                                 |
| Permitted Phases        | 2                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Detector Phase          | 5                                                                                   | 2                                                                                   | 6                                                                                   |                                                                                     | 8                                                                                   | 5 8                                                                                 |
| Switch Phase            |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Minimum Initial (s)     | 6.0                                                                                 | 10.0                                                                                | 10.0                                                                                |                                                                                     | 6.0                                                                                 |                                                                                     |
| Minimum Split (s)       | 11.0                                                                                | 15.0                                                                                | 23.0                                                                                |                                                                                     | 10.0                                                                                |                                                                                     |
| Total Split (s)         | 17.0                                                                                | 67.0                                                                                | 50.0                                                                                |                                                                                     | 21.0                                                                                |                                                                                     |
| Total Split (%)         | 19.3%                                                                               | 76.1%                                                                               | 56.8%                                                                               |                                                                                     | 23.9%                                                                               |                                                                                     |
| Yellow Time (s)         | 3.0                                                                                 | 3.0                                                                                 | 3.0                                                                                 |                                                                                     | 3.0                                                                                 |                                                                                     |
| All-Red Time (s)        | 2.0                                                                                 | 2.0                                                                                 | 2.0                                                                                 |                                                                                     | 1.0                                                                                 |                                                                                     |
| Lost Time Adjust (s)    | 0.0                                                                                 | 0.0                                                                                 | 0.0                                                                                 |                                                                                     | 0.0                                                                                 |                                                                                     |
| Total Lost Time (s)     | 5.0                                                                                 | 5.0                                                                                 | 5.0                                                                                 |                                                                                     | 4.0                                                                                 |                                                                                     |
| Lead/Lag                | Lead                                                                                |                                                                                     | Lag                                                                                 |                                                                                     |                                                                                     |                                                                                     |
| Lead-Lag Optimize?      | Yes                                                                                 |                                                                                     | Yes                                                                                 |                                                                                     |                                                                                     |                                                                                     |
| Recall Mode             | None                                                                                | C-Min                                                                               | None                                                                                |                                                                                     | None                                                                                |                                                                                     |
| Act Effct Green (s)     | 61.6                                                                                | 61.6                                                                                | 45.8                                                                                |                                                                                     | 17.4                                                                                | 32.2                                                                                |
| Actuated g/C Ratio      | 0.70                                                                                | 0.70                                                                                | 0.52                                                                                |                                                                                     | 0.20                                                                                | 0.37                                                                                |
| v/c Ratio               | 0.63                                                                                | 0.38                                                                                | 0.66                                                                                |                                                                                     | 0.31                                                                                | 0.55                                                                                |
| Control Delay           | 11.7                                                                                | 6.8                                                                                 | 20.2                                                                                |                                                                                     | 32.0                                                                                | 25.6                                                                                |
| Queue Delay             | 0.0                                                                                 | 0.0                                                                                 | 0.0                                                                                 |                                                                                     | 0.0                                                                                 | 0.0                                                                                 |
| Total Delay             | 11.7                                                                                | 6.8                                                                                 | 20.2                                                                                |                                                                                     | 32.0                                                                                | 25.6                                                                                |
| LOS                     | B                                                                                   | A                                                                                   | C                                                                                   |                                                                                     | C                                                                                   | C                                                                                   |
| Approach Delay          |                                                                                     | 8.6                                                                                 | 20.2                                                                                |                                                                                     | 27.2                                                                                |                                                                                     |
| Approach LOS            |                                                                                     | A                                                                                   | C                                                                                   |                                                                                     | C                                                                                   |                                                                                     |
| Queue Length 50th (ft)  | 54                                                                                  | 106                                                                                 | 251                                                                                 |                                                                                     | 51                                                                                  | 137                                                                                 |
| Queue Length 95th (ft)  | 79                                                                                  | 145                                                                                 | 367                                                                                 |                                                                                     | 100                                                                                 | 222                                                                                 |
| Internal Link Dist (ft) |                                                                                     | 883                                                                                 | 654                                                                                 |                                                                                     | 809                                                                                 |                                                                                     |
| Turn Bay Length (ft)    | 175                                                                                 |                                                                                     |                                                                                     |                                                                                     | 75                                                                                  |                                                                                     |
| Base Capacity (vph)     | 496                                                                                 | 1360                                                                                | 1006                                                                                |                                                                                     | 378                                                                                 | 602                                                                                 |
| Starvation Cap Reductn  | 0                                                                                   | 0                                                                                   | 0                                                                                   |                                                                                     | 0                                                                                   | 0                                                                                   |
| Spillback Cap Reductn   | 0                                                                                   | 0                                                                                   | 0                                                                                   |                                                                                     | 0                                                                                   | 0                                                                                   |
| Storage Cap Reductn     | 0                                                                                   | 0                                                                                   | 0                                                                                   |                                                                                     | 0                                                                                   | 0                                                                                   |
| Reduced v/c Ratio       | 0.60                                                                                | 0.38                                                                                | 0.64                                                                                |                                                                                     | 0.29                                                                                | 0.54                                                                                |

| Intersection Summary                                       |                        |  |
|------------------------------------------------------------|------------------------|--|
| Area Type:                                                 | Other                  |  |
| Cycle Length: 88                                           |                        |  |
| Actuated Cycle Length: 88                                  |                        |  |
| Offset: 8 (9%), Referenced to phase 2:EBTL, Start of Green |                        |  |
| Natural Cycle: 55                                          |                        |  |
| Control Type: Actuated-Coordinated                         |                        |  |
| Maximum v/c Ratio: 0.66                                    |                        |  |
| Intersection Signal Delay: 16.8                            | Intersection LOS: B    |  |
| Intersection Capacity Utilization 64.2%                    | ICU Level of Service C |  |
| Analysis Period (min) 15                                   |                        |  |



12239.00 :: Needham Street  
19: Wells Avenue/JCC Driveway & Nahanton Street  
2025 Build Conditions without Shuttle Service  
Timing Plan: Saturday Midday

| Lane Group              | EBL   | EBT   | EBR   | WBL   | WBT   | WBR  | NBL   | NBT   | NBR  | SBL   | SBT   | SBR  |
|-------------------------|-------|-------|-------|-------|-------|------|-------|-------|------|-------|-------|------|
| Lane Configurations     | ↰     | ↱     | ↰     | ↰     | ↱     | ↰    | ↰     | ↱     | ↰    | ↰     | ↱     | ↰    |
| Traffic Volume (vph)    | 20    | 565   | 140   | 190   | 585   | 30   | 215   | 5     | 140  | 40    | 2     | 35   |
| Future Volume (vph)     | 20    | 565   | 140   | 190   | 585   | 30   | 215   | 5     | 140  | 40    | 2     | 35   |
| Ideal Flow (vphpl)      | 1900  | 1900  | 1900  | 1900  | 1900  | 1900 | 1900  | 1900  | 1900 | 1900  | 1900  | 1900 |
| Storage Length (ft)     | 125   |       | 125   | 150   |       | 0    | 0     |       | 0    | 75    |       | 0    |
| Storage Lanes           | 1     |       | 1     |       |       | 0    |       |       | 0    | 1     |       | 0    |
| Taper Length (ft)       | 25    |       | 25    |       |       | 25   |       |       | 25   |       |       |      |
| Satd. Flow (prot)       | 1805  | 1900  | 1615  | 1805  | 1884  | 0    | 1805  | 1624  | 0    | 1805  | 1628  | 0    |
| Flt Permitted           | 0.218 |       |       | 0.262 |       |      | 0.731 |       |      | 0.635 |       |      |
| Satd. Flow (perm)       | 414   | 1900  | 1570  | 498   | 1884  | 0    | 1389  | 1624  | 0    | 1206  | 1628  | 0    |
| Right Turn on Red       |       | Yes   |       |       | Yes   |      |       | Yes   |      |       | Yes   |      |
| Satd. Flow (RTOR)       |       | 130   |       |       | 5     |      |       | 152   |      |       | 38    |      |
| Link Speed (mph)        |       | 30    |       |       | 30    |      |       | 30    |      |       | 30    |      |
| Link Distance (ft)      |       | 797   |       |       | 963   |      |       | 598   |      |       | 628   |      |
| Travel Time (s)         |       | 18.1  |       |       | 21.9  |      |       | 13.6  |      |       | 14.3  |      |
| Confl. Peds. (#/hr)     |       |       | 1     | 1     |       |      |       |       |      |       |       |      |
| Confl. Bikes (#/hr)     |       |       | 10    |       | 12    |      |       |       |      |       |       |      |
| Peak Hour Factor        | 0.92  | 0.92  | 0.92  | 0.92  | 0.92  | 0.92 | 0.92  | 0.92  | 0.92 | 0.92  | 0.92  | 0.92 |
| Heavy Vehicles (%)      | 0%    | 0%    | 0%    | 0%    | 0%    | 0%   | 0%    | 0%    | 0%   | 0%    | 0%    | 0%   |
| Shared Lane Traffic (%) |       |       |       |       |       |      |       |       |      |       |       |      |
| Lane Group Flow (vph)   | 22    | 614   | 152   | 207   | 669   | 0    | 234   | 157   | 0    | 43    | 40    | 0    |
| Turn Type               | pm+pt | NA    | Perm  | pm+pt | NA    | Perm | NA    | Perm  | NA   | Perm  | NA    | 0    |
| Protected Phases        | 3     | 1     |       | 3     | 1     |      |       | 2     |      |       | 2     |      |
| Permitted Phases        | 1     |       | 1     | 1     |       |      | 2     |       |      | 2     |       |      |
| Detector Phase          | 3     | 1     | 1     | 3     | 1     |      | 2     | 2     |      | 2     | 2     |      |
| Switch Phase            |       |       |       |       |       |      |       |       |      |       |       |      |
| Minimum Initial (s)     | 6.0   | 6.0   | 6.0   | 6.0   | 6.0   |      | 6.0   | 6.0   |      | 6.0   | 6.0   |      |
| Minimum Split (s)       | 10.0  | 11.0  | 11.0  | 10.0  | 11.0  |      | 11.0  | 11.0  |      | 11.0  | 11.0  |      |
| Total Split (s)         | 16.0  | 55.0  | 55.0  | 16.0  | 55.0  |      | 20.0  | 20.0  |      | 20.0  | 20.0  |      |
| Total Split (%)         | 17.6% | 60.4% | 60.4% | 17.6% | 60.4% |      | 22.0% | 22.0% |      | 22.0% | 22.0% |      |
| Yellow Time (s)         | 3.0   | 3.0   | 3.0   | 3.0   | 3.0   |      | 3.0   | 3.0   |      | 3.0   | 3.0   |      |
| All-Red Time (s)        | 1.0   | 2.0   | 2.0   | 1.0   | 2.0   |      | 2.0   | 2.0   |      | 2.0   | 2.0   |      |
| Lost Time Adjust (s)    | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   |      | 0.0   | 0.0   |      | 0.0   | 0.0   |      |
| Total Lost Time (s)     | 4.0   | 5.0   | 5.0   | 4.0   | 5.0   |      | 5.0   | 5.0   |      | 5.0   | 5.0   |      |
| Lead/Lag                |       | Lead  | Lead  |       | Lead  |      | Lag   | Lag   |      | Lag   | Lag   |      |
| Lead-Lag Optimize?      |       |       |       |       |       |      |       |       |      |       |       |      |
| Recall Mode             | None  | None  | None  | None  | None  |      | None  | None  |      | None  | None  |      |
| Act Effct Green (s)     | 44.8  | 36.1  | 36.1  | 44.8  | 36.1  |      | 15.4  | 15.4  |      | 15.4  | 15.4  |      |
| Actuated g/C Ratio      | 0.61  | 0.49  | 0.49  | 0.61  | 0.49  |      | 0.21  | 0.21  |      | 0.21  | 0.21  |      |
| v/c Ratio               | 0.06  | 0.66  | 0.18  | 0.47  | 0.72  |      | 0.81  | 0.34  |      | 0.17  | 0.11  |      |
| Control Delay           | 3.9   | 17.4  | 3.1   | 8.1   | 19.2  |      | 55.0  | 8.7   |      | 31.0  | 12.3  |      |
| Queue Delay             | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   |      | 0.0   | 0.0   |      | 0.0   | 0.0   |      |
| Total Delay             | 3.9   | 17.4  | 3.1   | 8.1   | 19.2  |      | 55.0  | 8.7   |      | 31.0  | 12.3  |      |
| LOS                     | A     | B     | A     | A     | B     |      | D     | A     |      | C     | B     |      |
| Approach Delay          |       | 14.3  |       |       | 16.6  |      |       | 36.4  |      |       | 22.0  |      |
| Approach LOS            |       | B     |       |       | B     |      |       | D     |      |       | C     |      |
| Queue Length 50th (ft)  | 3     | 193   | 5     | 29    | 219   |      | 103   | 2     |      | 16    | 1     |      |
| Queue Length 95th (ft)  | 8     | 305   | 30    | 49    | 347   |      | #280  | 54    |      | 52    | 28    |      |
| Internal Link Dist (ft) |       | 717   |       |       | 883   |      |       | 518   |      |       | 548   |      |
| Turn Bay Length (ft)    | 125   |       | 125   | 150   |       |      |       |       |      | 75    |       |      |
| Base Capacity (vph)     | 506   | 1327  | 1135  | 547   | 1317  |      | 290   | 460   |      | 252   | 370   |      |
| Starvation Cap Reductn  | 0     | 0     | 0     | 0     | 0     |      | 0     | 0     |      | 0     | 0     |      |
| Spillback Cap Reductn   | 0     | 0     | 0     | 0     | 0     |      | 0     | 0     |      | 0     | 0     |      |
| Storage Cap Reductn     | 0     | 0     | 0     | 0     | 0     |      | 0     | 0     |      | 0     | 0     |      |
| Reduced v/c Ratio       | 0.04  | 0.46  | 0.13  | 0.38  | 0.51  |      | 0.81  | 0.34  |      | 0.17  | 0.11  |      |

| Intersection Summary              |                                                               |                        |
|-----------------------------------|---------------------------------------------------------------|------------------------|
| Area Type:                        | Other                                                         |                        |
| Cycle Length:                     | 91                                                            |                        |
| Actuated Cycle Length:            | 73.6                                                          |                        |
| Natural Cycle:                    | 60                                                            |                        |
| Control Type:                     | Actuated-Uncoordinated                                        |                        |
| Maximum v/c Ratio:                | 0.81                                                          |                        |
| Intersection Signal Delay:        | 19.6                                                          | Intersection LOS: B    |
| Intersection Capacity Utilization | 73.0%                                                         | ICU Level of Service D |
| Analysis Period (min)             | 15                                                            |                        |
| #                                 | 95th percentile volume exceeds capacity, queue may be longer. |                        |
|                                   | Queue shown is maximum after two cycles.                      |                        |

|                         |                                                                                      |  |  |  |  |  |  |  |  |  |  |  |
|-------------------------|--------------------------------------------------------------------------------------|--|--|--|--|--|--|--|--|--|--|--|
| Splits and Phases:      | 19: Wells Avenue/JCC Driveway & Nahanton Street                                      |  |  |  |  |  |  |  |  |  |  |  |
|                         |                                                                                      |  |  |  |  |  |  |  |  |  |  |  |
| Lanes, Volumes, Timings | \w\b\proj\Wat-LD\12239.00\tech\Traffic\Synchro\TIA_2018\2025 BD_SAT_CONSERVATIVE.syn |  |  |  |  |  |  |  |  |  |  |  |
| VHB/MSD                 | 07/03/2018                                                                           |  |  |  |  |  |  |  |  |  |  |  |

12239.00 :: Needham Street  
20: Highland Avenue & Riverside Street  
2025 Build Conditions without Shuttle Service  
Timing Plan: Saturday Midday

| Intersection             |        |        |       |        |      |      |
|--------------------------|--------|--------|-------|--------|------|------|
| Int Delay, s/veh         | 0.4    |        |       |        |      |      |
| Movement                 | NWL    | NWR    | NET   | NER    | SWL  | SWT  |
| Lane Configurations      | ↰      |        | ↰↱    |        |      | ↱    |
| Traffic Vol, veh/h       | 5      | 10     | 985   | 2      | 5    | 1145 |
| Future Vol, veh/h        | 5      | 10     | 985   | 2      | 5    | 1145 |
| Conflicting Peds, #/hr   | 0      | 0      | 0     | 5      | 5    | 0    |
| Sign Control             | Stop   | Stop   | Free  | Free   | Free | Free |
| RT Channelized           | -      | None   | -     | None   | -    | None |
| Storage Length           | 0      | -      | -     | -      | -    | -    |
| Veh in Median Storage, # | 0      | -      | 0     | -      | -    | 0    |
| Grade, %                 | 0      | -      | 0     | -      | -    | 0    |
| Peak Hour Factor         | 92     | 92     | 92    | 92     | 92   | 92   |
| Heavy Vehicles, %        | 0      | 0      | 0     | 0      | 0    | 0    |
| Mvmt Flow                | 5      | 11     | 1071  | 2      | 5    | 1245 |
|                          |        |        |       |        |      |      |
| Major/Minor              | Minor1 | Major1 |       | Major2 |      |      |
| Conflicting Flow All     | 2332   | 541    | 0     | 0      | 1078 | 0    |
| Stage 1                  | 1077   | -      | -     | -      | -    | -    |
| Stage 2                  | 1255   | -      | -     | -      | -    | -    |
| Critical Hdwy            | 6.6    | 6.9    | -     | -      | 4.1  | -    |
| Critical Hdwy Stg 1      | 5.8    | -      | -     | -      | -    | -    |
| Critical Hdwy Stg 2      | 5.4    | -      | -     | -      | -    | -    |
| Follow-up Hdwy           | 3.5    | 3.3    | -     | -      | 2.2  | -    |
| Pot Cap-1 Maneuver       | 36     | 491    | -     | -      | 655  | -    |
| Stage 1                  | 293    | -      | -     | -      | -    | -    |
| Stage 2                  | 271    | -      | -     | -      | -    | -    |
| Platoon blocked, %       |        |        | -     | -      | -    | -    |
| Mov Cap-1 Maneuver       | 35     | 489    | -     | -      | 655  | -    |
| Mov Cap-2 Maneuver       | 35     | -      | -     | -      | -    | -    |
| Stage 1                  | 292    | -      | -     | -      | -    | -    |
| Stage 2                  | 264    | -      | -     | -      | -    | -    |
|                          |        |        |       |        |      |      |
| Approach                 | NW     | NE     |       | SW     |      |      |
| HCM Control Delay, s     | 52.4   | 0      |       | 0      |      |      |
| HCM LOS                  | F      |        |       |        |      |      |
|                          |        |        |       |        |      |      |
| Minor Lane/Major Mvmt    | NET    | NER    | NWLn1 | SWL    | SWT  |      |
| Capacity (veh/h)         | -      | -      | 92    | 655    | -    |      |
| HCM Lane V/C Ratio       | -      | -      | 0.177 | 0.008  | -    |      |
| HCM Control Delay (s)    | -      | -      | 52.4  | 10.5   | 0    |      |
| HCM Lane LOS             | -      | -      | F     | B      | A    |      |
| HCM 95th %ile Q(veh)     | -      | -      | 0.6   | 0      | -    |      |

12239.00 :: Needham Street  
21: Highland Avenue & Highland Terrace/Highland Circle

2025 Build Conditions without Shuttle Service  
Timing Plan: Saturday MIDDAY

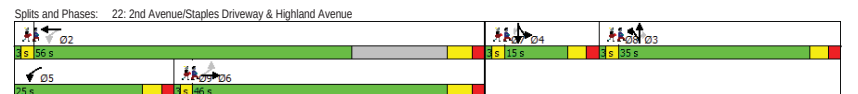
| Intersection             |        |        |      |       |        |       |      |        |      |      |      |      |
|--------------------------|--------|--------|------|-------|--------|-------|------|--------|------|------|------|------|
| Int Delay, s/veh         | 0.9    |        |      |       |        |       |      |        |      |      |      |      |
| Movement                 | SEL    | SET    | SER  | NWL   | NWT    | NWR   | NEL  | NET    | NER  | SWL  | SWT  | SWR  |
| Lane Configurations      |        |        |      |       |        |       |      |        |      |      |      |      |
| Traffic Vol, veh/h       | 5      | 0      | 10   | 10    | 0      | 5     | 10   | 975    | 10   | 2    | 1145 | 2    |
| Future Vol, veh/h        | 5      | 0      | 10   | 10    | 0      | 5     | 10   | 975    | 10   | 2    | 1145 | 2    |
| Conflicting Peds, #/hr   | 0      | 0      | 0    | 0     | 0      | 0     | 1    | 0      | 6    | 6    | 0    | 1    |
| Sign Control             | Stop   | Stop   | Stop | Stop  | Stop   | Stop  | Free | Free   | Free | Free | Free | Free |
| RT Channelized           | -      | -      | None | -     | -      | None  | -    | -      | None | -    | -    | None |
| Storage Length           | -      | -      | -    | -     | -      | -     | -    | -      | -    | -    | -    | -    |
| Veh in Median Storage, # | -      | 0      | -    | -     | 0      | -     | -    | 0      | -    | -    | 0    | -    |
| Grade, %                 | -      | 0      | -    | -     | 0      | -     | -    | 0      | -    | -    | 0    | -    |
| Peak Hour Factor         | 92     | 92     | 92   | 92    | 92     | 92    | 92   | 92     | 92   | 92   | 92   | 92   |
| Heavy Vehicles, %        | 0      | 0      | 0    | 0     | 0      | 0     | 1    | 1      | 1    | 0    | 0    | 0    |
| Mvmt Flow                | 5      | 0      | 11   | 11    | 0      | 5     | 11   | 1060   | 11   | 2    | 1245 | 2    |
|                          |        |        |      |       |        |       |      |        |      |      |      |      |
| Major/Minor              | Minor2 | Minor1 |      |       | Major1 |       |      | Major2 |      |      |      |      |
| Conflicting Flow All     | 1803   | 2349   | 624  | 1720  | 2345   | 541   | 1248 | 0      | 0    | 1077 | 0    | 0    |
| Stage 1                  | 1251   | 1251   | -    | 1093  | 1093   | -     | -    | -      | -    | -    | -    | -    |
| Stage 2                  | 552    | 1098   | -    | 627   | 1252   | -     | -    | -      | -    | -    | -    | -    |
| Critical Hdwy            | 7.5    | 6.5    | 6.9  | 7.5   | 6.5    | 6.9   | 4.12 | -      | -    | 4.1  | -    | -    |
| Critical Hdwy Stg 1      | 6.5    | 5.5    | -    | 6.5   | 5.5    | -     | -    | -      | -    | -    | -    | -    |
| Critical Hdwy Stg 2      | 6.5    | 5.5    | -    | 6.5   | 5.5    | -     | -    | -      | -    | -    | -    | -    |
| Follow-up Hdwy           | 3.5    | 4      | 3.3  | 3.5   | 4      | 3.3   | 2.21 | -      | -    | 2.2  | -    | -    |
| Pot Cap-1 Maneuver       | 51     | 36     | 433  | 59    | 37     | 491   | 559  | -      | -    | 655  | -    | -    |
| Stage 1                  | 186    | 246    | -    | 232   | 293    | -     | -    | -      | -    | -    | -    | -    |
| Stage 2                  | 491    | 291    | -    | 443   | 246    | -     | -    | -      | -    | -    | -    | -    |
| Platoon blocked, %       |        |        |      |       |        |       |      |        |      |      |      |      |
| Mov Cap-1 Maneuver       | 48     | 34     | 433  | 55    | 35     | 489   | 559  | -      | -    | 655  | -    | -    |
| Mov Cap-2 Maneuver       | 48     | 34     | -    | 55    | 35     | -     | -    | -      | -    | -    | -    | None |
| Stage 1                  | 177    | 243    | -    | 220   | 277    | -     | -    | -      | -    | -    | -    | -    |
| Stage 2                  | 462    | 275    | -    | 428   | 243    | -     | -    | -      | -    | -    | -    | -    |
|                          |        |        |      |       |        |       |      |        |      |      |      |      |
| Approach                 | SE     | NW     |      |       | NE     |       |      | SW     |      |      |      |      |
| HCM Control Delay, s     | 40.3   | 63     |      |       | 0.4    |       |      | 0.1    |      |      |      |      |
| HCM LOS                  | E      | F      |      |       |        |       |      |        |      |      |      |      |
|                          |        |        |      |       |        |       |      |        |      |      |      |      |
| Minor Lane/Major Mvmt    | NEL    | NET    | NER  | NWLn1 | SELn1  | SWL   | SWT  | SWR    |      |      |      |      |
| Capacity (veh/h)         | 559    | -      | -    | 78    | 118    | 655   | -    |        |      |      |      |      |
| HCM Lane V/C Ratio       | 0.019  | -      | -    | 0.209 | 0.138  | 0.003 | -    |        |      |      |      |      |
| HCM Control Delay (s)    | 11.6   | 0.3    | -    | 63    | 40.3   | 10.5  | 0.1  |        |      |      |      |      |
| HCM Lane LOS             | B      | A      | -    | F     | E      | B     | A    |        |      |      |      |      |
| HCM 95th %tile Q(veh)    | 0.1    | -      | -    | 0.7   | 0.5    | 0     | -    |        |      |      |      |      |

12239.00 :: Needham Street  
22: 2nd Avenue/Staples Driveway & Highland Avenue

2025 Build Conditions without Shuttle Service  
Timing Plan: Saturday MIDDAY

| Lane Group              | EBL   | EBT   | EBR  | WBL   | WBT   | WBR  | NBL   | NBT   | NBR   | SBL   | SBT   | SBR   | Ø1   | Ø7   | Ø8   | Ø9   |
|-------------------------|-------|-------|------|-------|-------|------|-------|-------|-------|-------|-------|-------|------|------|------|------|
| Lane Configurations     | ↰     | ↰     | ↰    | ↰     | ↰     | ↰    | ↰     | ↰     | ↰     | ↰     | ↰     | ↰     |      |      |      |      |
| Traffic Volume (vph)    | 15    | 750   | 145  | 155   | 975   | 40   | 140   | 15    | 175   | 70    | 10    | 15    |      |      |      |      |
| Future Volume (vph)     | 15    | 750   | 145  | 155   | 975   | 40   | 140   | 15    | 175   | 70    | 10    | 15    |      |      |      |      |
| Ideal Flow (vphpl)      | 1900  | 1900  | 1900 | 1900  | 1900  | 1900 | 1900  | 1900  | 1900  | 1900  | 1900  | 1900  |      |      |      |      |
| Storage Length (ft)     | 100   | 0     | 100  | 0     | 100   | 0    | 150   | 100   | 0     | 100   | 0     | 50    |      |      |      |      |
| Storage Lanes           | 1     | 0     | 0    | 0     | 0     | 0    | 1     | 1     | 0     | 1     | 0     | 1     |      |      |      |      |
| Taper Length (ft)       | 25    |       |      | 25    |       |      | 25    |       |       | 25    |       |       |      |      |      |      |
| Satd. Flow (prot)       | 1787  | 3465  | 0    | 0     | 3563  | 0    | 1698  | 1717  | 1599  | 0     | 1820  | 1615  |      |      |      |      |
| Flt Permitted           | 0.157 |       |      | 0     | 0.619 |      | 0.950 | 0.961 |       |       | 0.958 |       |      |      |      |      |
| Satd. Flow (perm)       | 295   | 3465  | 0    | 0     | 2221  | 0    | 1698  | 1717  | 1573  | 0     | 1814  | 1591  |      |      |      |      |
| Right Turn on Red       |       | Yes   |      |       | Yes   |      |       | Yes   |       |       | Yes   |       |      |      |      |      |
| Satd. Flow (RTOR)       | 18    |       |      | 4     |       |      |       | 190   |       |       |       | 176   |      |      |      |      |
| Link Speed (mph)        | 30    |       |      | 30    |       |      | 30    |       |       |       | 30    |       |      |      |      |      |
| Link Distance (ft)      | 210   |       |      | 361   |       |      | 859   |       |       |       | 290   |       |      |      |      |      |
| Travel Time (s)         | 4.8   |       |      | 8.2   |       |      | 19.5  |       |       |       | 6.6   |       |      |      |      |      |
| Confl. Peds. (#/hr)     | 3     |       | 8    | 8     |       | 3    |       | 2     | 2     |       |       |       |      |      |      |      |
| Confl. Bikes (#/hr)     |       |       | 1    |       | 1     |      |       |       |       |       |       | 1     |      |      |      |      |
| Peak Hour Factor        | 0.92  | 0.92  | 0.92 | 0.92  | 0.92  | 0.92 | 0.92  | 0.92  | 0.92  | 0.92  | 0.92  | 0.92  |      |      |      |      |
| Heavy Vehicles (%)      | 1%    | 1%    | 1%   | 0%    | 0%    | 0%   | 1%    | 1%    | 1%    | 0%    | 0%    | 0%    |      |      |      |      |
| Shared Lane Traffic (%) |       |       |      |       |       |      | 45%   |       |       |       |       |       |      |      |      |      |
| Lane Group Flow (vph)   | 16    | 973   | 0    | 0     | 1271  | 0    | 84    | 84    | 190   | 0     | 87    | 16    |      |      |      |      |
| Turn Type               | Perm  | NA    |      | pm+pt | NA    |      | Split | NA    | Perm  |       | Split | NA    | Perm |      |      |      |
| Protected Phases        | 6     | 5     | 2    | 3     | 3     | 3    | 3     | 3     | 4     | 4     | 4     | 4     | 1    | 7    | 8    | 9    |
| Permitted Phases        | 6     |       | 2    |       |       |      |       | 3     |       |       |       | 4     |      |      |      |      |
| Detector Phase          | 6     | 6     | 5    | 2     |       | 3    | 3     | 3     | 4     | 4     | 4     | 4     |      |      |      |      |
| Switch Phase            |       |       |      |       |       |      |       |       |       |       |       |       |      |      |      |      |
| Minimum Initial (s)     | 15.0  | 15.0  |      | 4.0   | 15.0  |      | 10.0  | 10.0  | 10.0  | 4.0   | 4.0   | 4.0   | 1.0  | 1.0  | 1.0  | 1.0  |
| Minimum Split (s)       | 31.0  | 31.0  |      | 9.0   | 23.0  |      | 23.0  | 23.0  | 23.0  | 26.0  | 26.0  | 26.0  | 3.0  | 3.0  | 3.0  | 3.0  |
| Total Split (s)         | 46.0  | 46.0  |      | 25.0  | 56.0  |      | 35.0  | 35.0  | 35.0  | 15.0  | 15.0  | 15.0  | 3.0  | 3.0  | 3.0  | 3.0  |
| Total Split (%)         | 35.4% | 35.4% |      | 19.2% | 43.1% |      | 26.9% | 26.9% | 26.9% | 11.5% | 11.5% | 11.5% | 2%   | 2%   | 2%   | 2%   |
| Yellow Time (s)         | 4.0   | 4.0   |      | 3.0   | 4.0   |      | 3.0   | 3.0   | 3.0   | 3.0   | 3.0   | 3.0   | 2.0  | 2.0  | 2.0  | 2.0  |
| All-Red Time (s)        | 2.0   | 2.0   |      | 2.0   | 2.0   |      | 2.0   | 2.0   | 2.0   | 2.0   | 2.0   | 2.0   | 0.0  | 0.0  | 0.0  | 0.0  |
| Lost Time Adjust (s)    | 0.0   | 0.0   |      | 0.0   | 0.0   |      | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   |      |      |      |      |
| Total Lost Time (s)     | 6.0   | 6.0   |      | 6.0   | 5.0   |      | 5.0   | 5.0   | 5.0   | 5.0   | 5.0   | 5.0   |      |      |      |      |
| Lead/Lag                |       |       |      | Lead  | Lag   |      | Lag   | Lag   | Lag   | Lag   | Lag   | Lag   | Lead | Lead | Lead | Lag  |
| Lead-Lag Optimize?      |       |       |      |       |       |      |       |       |       |       |       |       |      |      |      |      |
| Recall Mode             | None  | None  |      | None  | None  |      | None  | None  | None  | None  | None  | None  | None | None | None | None |
| Act Effect Green (s)    | 50.6  | 50.6  |      | 50.6  | 11.5  |      | 11.5  | 11.5  | 11.5  | 8.3   | 8.3   | 8.3   |      |      |      |      |
| Actuated g/C Ratio      | 0.60  | 0.60  |      | 0.60  | 0.14  |      | 0.14  | 0.14  | 0.14  | 0.10  | 0.10  | 0.10  |      |      |      |      |
| v/c Ratio               | 0.09  | 0.47  |      | 0.96  | 0.37  |      | 0.36  | 0.51  | 0.49  | 0.05  | 0.05  | 0.05  |      |      |      |      |
| Control Delay           | 12.4  | 11.9  |      | 36.6  | 40.2  |      | 40.1  | 10.7  | 48.5  | 0.3   | 0.3   | 0.3   |      |      |      |      |
| Queue Delay             | 0.0   | 0.0   |      | 0.0   | 0.0   |      | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   |      |      |      |      |
| Total Delay             | 12.4  | 11.9  |      | 36.6  | 40.2  |      | 40.1  | 10.7  | 48.5  | 0.3   | 0.3   | 0.3   |      |      |      |      |
| LOS                     | B     | B     |      | D     | D     |      | D     | B     | D     | A     | A     | A     |      |      |      |      |
| Approach Delay          |       |       |      | 36.6  |       |      | 24.5  |       |       | 41.0  |       |       |      |      |      |      |
| Approach LOS            |       |       |      | D     |       |      | C     |       |       | D     |       |       |      |      |      |      |
| Queue Length 50th (ft)  | 3     | 138   |      | 310   |       |      | 44    | 44    | 0     | 44    | 0     |       |      |      |      |      |
| Queue Length 95th (ft)  | 18    | 273   |      | 639   |       |      | 95    | 95    | 58    | 103   | 0     |       |      |      |      |      |
| Internal Link Dist (ft) |       | 130   |      | 281   |       |      | 779   |       |       | 210   |       |       |      |      |      |      |
| Turn Bay Length (ft)    | 100   |       |      |       |       |      | 150   |       | 100   |       | 50    |       |      |      |      |      |
| Base Capacity (vph)     | 175   | 2070  |      | 1757  |       |      | 606   | 613   | 684   | 216   | 344   |       |      |      |      |      |
| Starvation Cap Reductn  | 0     | 0     |      | 0     | 0     | 0    | 0     | 0     | 0     | 0     | 0     |       |      |      |      |      |
| Spillback Cap Reductn   | 0     | 0     |      | 0     | 0     | 0    | 0     | 0     | 0     | 0     | 0     |       |      |      |      |      |
| Storage Cap Reductn     | 0     | 0     |      | 0     | 0     | 0    | 0     | 0     | 0     | 0     | 0     |       |      |      |      |      |
| Reduced v/c Ratio       | 0.09  | 0.47  |      | 0.72  |       |      | 0.14  | 0.14  | 0.28  | 0.40  | 0.05  |       |      |      |      |      |

| Intersection Summary                                            |                        |  |
|-----------------------------------------------------------------|------------------------|--|
| Area Type:                                                      | Other                  |  |
| Cycle Length: 130                                               |                        |  |
| Actuated Cycle Length: 85                                       |                        |  |
| Natural Cycle: 150                                              |                        |  |
| Control Type: Actuated-Uncoordinated                            |                        |  |
| Maximum v/c Ratio: 0.96                                         |                        |  |
| Intersection Signal Delay: 26.2                                 | Intersection LOS: C    |  |
| Intersection Capacity Utilization 83.6%                         | ICU Level of Service E |  |
| Analysis Period (min) 15                                        |                        |  |
| # 95th percentile volume exceeds capacity, queue may be longer. |                        |  |
| Queue shown is maximum after two cycles.                        |                        |  |



12239.00 :: Needham Street  
23: Highland Avenue & Charles Street

2025 Build Conditions without Shuttle Service  
Timing Plan: Saturday MIDDAY

| Intersection             |                                                                                   |                                                                                   |                                                                                   |       |                                                                                   |      |
|--------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-------|-----------------------------------------------------------------------------------|------|
| Int Delay, s/veh         | 5.8                                                                               |                                                                                   |                                                                                   |       |                                                                                   |      |
| Movement                 | EBL                                                                               | EBT                                                                               | WBT                                                                               | WBR   | SBL                                                                               | SBR  |
| Lane Configurations      |  |  |  |       |  |      |
| Traffic Vol, veh/h       | 45                                                                                | 875                                                                               | 1110                                                                              | 20    | 35                                                                                | 110  |
| Future Vol, veh/h        | 45                                                                                | 875                                                                               | 1110                                                                              | 20    | 35                                                                                | 110  |
| Conflicting Peds, #/hr   | 3                                                                                 | 0                                                                                 | 0                                                                                 | 3     | 0                                                                                 | 0    |
| Sign Control             | Free                                                                              | Free                                                                              | Free                                                                              | Free  | Stop                                                                              | Stop |
| RT Channelized           | -                                                                                 | None                                                                              | -                                                                                 | None  | -                                                                                 | None |
| Storage Length           | 100                                                                               | -                                                                                 | -                                                                                 | -     | 0                                                                                 | -    |
| Veh in Median Storage, # | -                                                                                 | 0                                                                                 | 0                                                                                 | -     | 0                                                                                 | -    |
| Grade, %                 | -                                                                                 | 0                                                                                 | 0                                                                                 | -     | 0                                                                                 | -    |
| Peak Hour Factor         | 92                                                                                | 92                                                                                | 92                                                                                | 92    | 92                                                                                | 92   |
| Heavy Vehicles, %        | 1                                                                                 | 1                                                                                 | 1                                                                                 | 1     | 0                                                                                 | 0    |
| Mvmt Flow                | 49                                                                                | 951                                                                               | 1207                                                                              | 22    | 38                                                                                | 120  |
| Major/Minor              |                                                                                   |                                                                                   |                                                                                   |       |                                                                                   |      |
| Major1                   | Major2                                                                            |                                                                                   | Minor2                                                                            |       |                                                                                   |      |
| Conflicting Flow All     | 1231                                                                              | 0                                                                                 | -                                                                                 | 0     | 1793                                                                              | 617  |
| Stage 1                  | -                                                                                 | -                                                                                 | -                                                                                 | -     | 1220                                                                              | -    |
| Stage 2                  | -                                                                                 | -                                                                                 | -                                                                                 | -     | 573                                                                               | -    |
| Critical Hdwy            | 4.12                                                                              | -                                                                                 | -                                                                                 | -     | 6.8                                                                               | 6.9  |
| Critical Hdwy Stg 1      | -                                                                                 | -                                                                                 | -                                                                                 | -     | 5.8                                                                               | -    |
| Critical Hdwy Stg 2      | -                                                                                 | -                                                                                 | -                                                                                 | -     | 5.8                                                                               | -    |
| Follow-up Hdwy           | 2.21                                                                              | -                                                                                 | -                                                                                 | -     | 3.5                                                                               | 3.3  |
| Pot Cap-1 Maneuver       | 567                                                                               | -                                                                                 | -                                                                                 | -     | 73                                                                                | 438  |
| Stage 1                  | -                                                                                 | -                                                                                 | -                                                                                 | -     | 246                                                                               | -    |
| Stage 2                  | -                                                                                 | -                                                                                 | -                                                                                 | -     | 533                                                                               | -    |
| Platoon blocked, %       | -                                                                                 | -                                                                                 | -                                                                                 | -     | -                                                                                 | -    |
| Mov Cap-1 Maneuver       | 567                                                                               | -                                                                                 | -                                                                                 | -     | 66                                                                                | 437  |
| Mov Cap-2 Maneuver       | -                                                                                 | -                                                                                 | -                                                                                 | -     | 66                                                                                | -    |
| Stage 1                  | -                                                                                 | -                                                                                 | -                                                                                 | -     | 245                                                                               | -    |
| Stage 2                  | -                                                                                 | -                                                                                 | -                                                                                 | -     | 486                                                                               | -    |
| Approach                 |                                                                                   |                                                                                   |                                                                                   |       |                                                                                   |      |
| EB                       | WB                                                                                |                                                                                   | SB                                                                                |       |                                                                                   |      |
| HCM Control Delay, s     | 0.6                                                                               | -                                                                                 | 0                                                                                 | -     | 83.7                                                                              | -    |
| HCM LOS                  | -                                                                                 | -                                                                                 | -                                                                                 | -     | F                                                                                 | -    |
| Minor Lane/Major Mvmt    |                                                                                   |                                                                                   |                                                                                   |       |                                                                                   |      |
| EBL                      | EBT                                                                               | WBT                                                                               | WBR                                                                               | SBLn1 |                                                                                   |      |
| Capacity (veh/h)         | 567                                                                               | -                                                                                 | -                                                                                 | -     | 185                                                                               |      |
| HCM Lane V/C Ratio       | 0.086                                                                             | -                                                                                 | -                                                                                 | -     | 0.852                                                                             |      |
| HCM Control Delay (s)    | 11.9                                                                              | -                                                                                 | -                                                                                 | -     | 83.7                                                                              |      |
| HCM Lane LOS             | B                                                                                 | -                                                                                 | -                                                                                 | -     | F                                                                                 |      |
| HCM 95th %tile Q(veh)    | 0.3                                                                               | -                                                                                 | -                                                                                 | -     | 6.2                                                                               |      |

12239.00 :: Needham Street  
24: Highland Avenue & Wexford Street

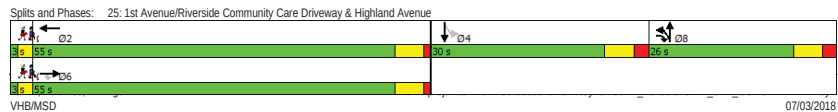
2025 Build Conditions without Shuttle Service  
Timing Plan: Saturday MIDDAY

| Intersection             |                                                                                     |                                                                                     |                                                                                     |       |                                                                                     |      |
|--------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------|-------------------------------------------------------------------------------------|------|
| Int Delay, s/veh         | 17.9                                                                                |                                                                                     |                                                                                     |       |                                                                                     |      |
| Movement                 | EBL                                                                                 | EBT                                                                                 | WBT                                                                                 | WBR   | SBL                                                                                 | SBR  |
| Lane Configurations      |  |  |  |       |  |      |
| Traffic Vol, veh/h       | 90                                                                                  | 880                                                                                 | 1185                                                                                | 35    | 40                                                                                  | 130  |
| Future Vol, veh/h        | 90                                                                                  | 880                                                                                 | 1185                                                                                | 35    | 40                                                                                  | 130  |
| Conflicting Peds, #/hr   | 2                                                                                   | 0                                                                                   | 0                                                                                   | 2     | 0                                                                                   | 0    |
| Sign Control             | Free                                                                                | Free                                                                                | Free                                                                                | Free  | Stop                                                                                | Stop |
| RT Channelized           | -                                                                                   | None                                                                                | -                                                                                   | None  | -                                                                                   | None |
| Storage Length           | 100                                                                                 | -                                                                                   | -                                                                                   | -     | 0                                                                                   | -    |
| Veh in Median Storage, # | -                                                                                   | 0                                                                                   | 0                                                                                   | -     | 0                                                                                   | -    |
| Grade, %                 | -                                                                                   | 0                                                                                   | 0                                                                                   | -     | 0                                                                                   | -    |
| Peak Hour Factor         | 92                                                                                  | 92                                                                                  | 92                                                                                  | 92    | 92                                                                                  | 92   |
| Heavy Vehicles, %        | 0                                                                                   | 0                                                                                   | 1                                                                                   | 1     | 0                                                                                   | 0    |
| Mvmt Flow                | 98                                                                                  | 957                                                                                 | 1288                                                                                | 38    | 43                                                                                  | 141  |
| Major/Minor              |                                                                                     |                                                                                     |                                                                                     |       |                                                                                     |      |
| Major1                   | Major2                                                                              |                                                                                     | Minor2                                                                              |       |                                                                                     |      |
| Conflicting Flow All     | 1328                                                                                | 0                                                                                   | -                                                                                   | 0     | 1963                                                                                | 665  |
| Stage 1                  | -                                                                                   | -                                                                                   | -                                                                                   | -     | 1309                                                                                | -    |
| Stage 2                  | -                                                                                   | -                                                                                   | -                                                                                   | -     | 674                                                                                 | -    |
| Critical Hdwy            | 4.1                                                                                 | -                                                                                   | -                                                                                   | -     | 6.8                                                                                 | 6.9  |
| Critical Hdwy Stg 1      | -                                                                                   | -                                                                                   | -                                                                                   | -     | 5.8                                                                                 | -    |
| Critical Hdwy Stg 2      | -                                                                                   | -                                                                                   | -                                                                                   | -     | 5.8                                                                                 | -    |
| Follow-up Hdwy           | 2.2                                                                                 | -                                                                                   | -                                                                                   | -     | 3.5                                                                                 | 3.3  |
| Pot Cap-1 Maneuver       | 527                                                                                 | -                                                                                   | -                                                                                   | -     | 55                                                                                  | 407  |
| Stage 1                  | -                                                                                   | -                                                                                   | -                                                                                   | -     | 221                                                                                 | -    |
| Stage 2                  | -                                                                                   | -                                                                                   | -                                                                                   | -     | 473                                                                                 | -    |
| Platoon blocked, %       | -                                                                                   | -                                                                                   | -                                                                                   | -     | -                                                                                   | -    |
| Mov Cap-1 Maneuver       | 527                                                                                 | -                                                                                   | -                                                                                   | -     | 45                                                                                  | 406  |
| Mov Cap-2 Maneuver       | -                                                                                   | -                                                                                   | -                                                                                   | -     | 45                                                                                  | -    |
| Stage 1                  | -                                                                                   | -                                                                                   | -                                                                                   | -     | 221                                                                                 | -    |
| Stage 2                  | -                                                                                   | -                                                                                   | -                                                                                   | -     | 384                                                                                 | -    |
| Approach                 |                                                                                     |                                                                                     |                                                                                     |       |                                                                                     |      |
| EB                       | WB                                                                                  |                                                                                     | SB                                                                                  |       |                                                                                     |      |
| HCM Control Delay, s     | 1.2                                                                                 | -                                                                                   | 0                                                                                   | -     | 241.6                                                                               | -    |
| HCM LOS                  | -                                                                                   | -                                                                                   | -                                                                                   | -     | F                                                                                   | -    |
| Minor Lane/Major Mvmt    |                                                                                     |                                                                                     |                                                                                     |       |                                                                                     |      |
| EBL                      | EBT                                                                                 | WBT                                                                                 | WBR                                                                                 | SBLn1 |                                                                                     |      |
| Capacity (veh/h)         | 527                                                                                 | -                                                                                   | -                                                                                   | -     | 141                                                                                 |      |
| HCM Lane V/C Ratio       | 0.186                                                                               | -                                                                                   | -                                                                                   | -     | 1.311                                                                               |      |
| HCM Control Delay (s)    | 13.4                                                                                | -                                                                                   | -                                                                                   | -     | 241.6                                                                               |      |
| HCM Lane LOS             | B                                                                                   | -                                                                                   | -                                                                                   | -     | F                                                                                   |      |
| HCM 95th %tile Q(veh)    | 0.7                                                                                 | -                                                                                   | -                                                                                   | -     | 11.5                                                                                |      |

12239.00 :: Needham Street  
25: 1st Avenue/Riverside Community Care Driveway & Highland Avenue  
Timing Plan: Saturday Midday

| Lane Group              | EBL   | EBT   | EBR   | WBL   | WBT  | WBR   | NBL   | NBT   | NBR   | SBL   | SBT  | SBR  | Ø1   | Ø5 |
|-------------------------|-------|-------|-------|-------|------|-------|-------|-------|-------|-------|------|------|------|----|
| Lane Configurations     |       | EBT   | EBR   | WBL   | WBT  | WBR   | NBL   | NBT   | NBR   | SBL   | SBT  | SBR  |      |    |
| Traffic Volume (vph)    | 0     | 880   | 130   | 0     | 1320 | 0     | 195   | 0     | 100   | 0     | 0    | 0    |      |    |
| Future Volume (vph)     | 0     | 880   | 130   | 0     | 1320 | 0     | 195   | 0     | 100   | 0     | 0    | 0    |      |    |
| Ideal Flow (vphpl)      | 1900  | 1900  | 1900  | 1900  | 1900 | 1900  | 1900  | 1900  | 1900  | 1900  | 1900 | 1900 |      |    |
| Storage Length (ft)     | 0     |       | 0     | 0     | 0    | 0     | 0     | 0     | 200   | 0     | 0    | 0    |      |    |
| Storage Lanes           | 0     |       | 1     | 0     | 0    | 1     | 0     | 0     | 0     | 0     | 0    | 0    |      |    |
| Taper Length (ft)       | 25    |       | 25    |       | 25   |       | 25    |       | 25    |       | 25   |      |      |    |
| Satd. Flow (prot)       | 0     | 3610  | 1615  | 0     | 3610 | 0     | 1715  | 1591  | 0     | 0     | 1900 | 0    |      |    |
| Fit Permitted           |       |       |       |       |      |       | 0.950 | 0.986 |       |       |      |      |      |    |
| Satd. Flow (perm)       | 0     | 3610  | 1577  | 0     | 3610 | 0     | 1715  | 1591  | 0     | 0     | 1900 | 0    |      |    |
| Right Turn on Red       |       | Yes   |       |       | Yes  |       | Yes   |       | Yes   |       | Yes  |      |      |    |
| Satd. Flow (RTOR)       |       | 141   |       |       |      |       | 96    |       |       |       |      |      |      |    |
| Link Speed (mph)        | 30    |       |       | 30    |      |       | 30    |       |       | 30    |      |      |      |    |
| Link Distance (ft)      | 377   |       |       | 272   |      |       | 825   |       |       | 147   |      |      |      |    |
| Travel Time (s)         | 8.6   |       |       | 6.2   |      |       | 18.8  |       |       | 3.3   |      |      |      |    |
| Confl. Peds. (#/hr)     |       | 1     | 1     |       |      |       |       |       |       |       |      |      |      |    |
| Confl. Bikes (#/hr)     |       | 1     |       |       |      |       |       |       |       |       |      |      |      |    |
| Peak Hour Factor        | 0.92  | 0.92  | 0.92  | 0.92  | 0.92 | 0.92  | 0.92  | 0.92  | 0.92  | 0.92  | 0.92 | 0.92 |      |    |
| Heavy Vehicles (%)      | 0%    | 0%    | 0%    | 0%    | 0%   | 0%    | 0%    | 0%    | 0%    | 0%    | 0%   | 0%   |      |    |
| Shared Lane Traffic (%) |       |       |       |       |      |       | 21%   |       |       |       |      |      |      |    |
| Lane Group Flow (vph)   | 0     | 957   | 141   | 0     | 1435 | 0     | 167   | 154   | 0     | 0     | 0    | 0    |      |    |
| Turn Type               |       | NA    | pm+ov |       | NA   |       | Split | NA    |       | 0     | 0    | 0    |      |    |
| Protected Phases        |       | 6     | 8     |       | 2    |       | 8     | 8     |       |       | 4    |      | 1    | 5  |
| Permitted Phases        |       | 6     |       |       |      |       |       |       |       | 4     |      |      |      |    |
| Detector Phase          |       | 6     | 8     |       | 2    |       | 8     | 8     |       | 4     | 4    |      |      |    |
| Switch Phase            |       |       |       |       |      |       |       |       |       |       |      |      |      |    |
| Minimum Initial (s)     | 10.0  | 6.0   |       | 10.0  |      | 6.0   | 6.0   |       | 6.0   | 6.0   |      | 1.0  | 1.0  |    |
| Minimum Split (s)       | 25.0  | 12.0  |       | 16.0  |      | 12.0  | 12.0  |       | 29.0  | 29.0  |      | 3.0  | 3.0  |    |
| Total Split (s)         | 55.0  | 26.0  |       | 55.0  |      | 26.0  | 26.0  |       | 30.0  | 30.0  |      | 3.0  | 3.0  |    |
| Total Split (%)         | 48.2% | 22.8% |       | 48.2% |      | 22.8% | 22.8% |       | 26.3% | 26.3% |      | 3%   | 3%   |    |
| Yellow Time (s)         | 4.0   | 4.0   |       | 4.0   |      | 4.0   | 4.0   |       | 4.0   | 4.0   |      | 2.0  | 2.0  |    |
| All-Red Time (s)        | 1.0   | 2.0   |       | 1.0   |      | 2.0   | 2.0   |       | 2.0   | 2.0   |      | 0.0  | 0.0  |    |
| Lost Time Adjust (s)    | 0.0   | 0.0   |       | 0.0   |      | 0.0   | 0.0   |       | 0.0   | 0.0   |      |      |      |    |
| Total Lost Time (s)     | 5.0   | 6.0   |       | 5.0   |      | 6.0   | 6.0   |       | 6.0   | 6.0   |      |      |      |    |
| Lead/Lag                |       | Lag   |       | Lag   |      |       |       |       |       |       |      | Lead | Lead |    |
| Lead-Lag Optimize?      | Yes   |       |       | Yes   |      |       |       |       |       |       |      | Yes  | Yes  |    |
| Recall Mode             | Min   | None  |       | Min   |      | None  | None  |       | None  | None  |      | None | None |    |
| Act Effect Green (s)    | 30.7  | 41.0  |       | 31.1  |      | 11.3  | 11.3  |       |       |       |      |      |      |    |
| Actuated g/C Ratio      | 0.57  | 0.76  |       | 0.58  |      | 0.21  | 0.21  |       |       |       |      |      |      |    |
| v/c Ratio               | 0.47  | 0.11  |       | 0.69  |      | 0.46  | 0.38  |       |       |       |      |      |      |    |
| Control Delay           | 8.0   | 0.4   |       | 10.2  |      | 25.3  | 12.5  |       |       |       |      |      |      |    |
| Queue Delay             | 0.0   | 0.0   |       | 0.0   |      | 0.0   | 0.0   |       |       |       |      |      |      |    |
| Total Delay             | 8.0   | 0.4   |       | 10.2  |      | 25.3  | 12.5  |       |       |       |      |      |      |    |
| LOS                     | A     | A     |       | B     |      | C     | B     |       |       |       |      |      |      |    |
| Approach Delay          | 7.0   |       |       | 10.2  |      |       | 19.2  |       |       |       |      |      |      |    |
| Approach LOS            | A     |       |       | B     |      |       | B     |       |       |       |      |      |      |    |
| Queue Length 50th (ft)  | 77    | 0     |       | 142   |      | 48    | 15    |       |       |       |      |      |      |    |
| Queue Length 95th (ft)  | 160   | 3     |       | 253   |      | 122   | 68    |       |       |       |      |      |      |    |
| Internal Link Dist (ft) | 297   |       |       | 192   |      |       | 745   |       |       | 67    |      |      |      |    |
| Turn Bay Length (ft)    |       |       |       |       |      |       |       |       |       |       |      |      |      |    |
| Base Capacity (vph)     | 3226  | 1401  |       | 3226  |      | 664   | 675   |       |       |       |      |      |      |    |
| Starvation Cap Reductn  | 0     | 0     |       | 0     |      | 0     | 0     |       |       |       |      |      |      |    |
| Spillback Cap Reductn   | 0     | 0     |       | 0     |      | 0     | 0     |       |       |       |      |      |      |    |
| Storage Cap Reductn     | 0     | 0     |       | 0     |      | 0     | 0     |       |       |       |      |      |      |    |
| Reduced v/c Ratio       | 0.30  | 0.10  |       | 0.44  |      | 0.25  | 0.23  |       |       |       |      |      |      |    |

| Intersection Summary                    |                        |
|-----------------------------------------|------------------------|
| Area Type:                              | Other                  |
| Cycle Length: 114                       |                        |
| Actuated Cycle Length: 54               |                        |
| Natural Cycle: 90                       |                        |
| Control Type: Actuated-Uncoordinated    |                        |
| Maximum v/c Ratio: 0.69                 |                        |
| Intersection Signal Delay: 10.0         | Intersection LOS: A    |
| Intersection Capacity Utilization 54.1% | ICU Level of Service A |
| Analysis Period (min) 15                |                        |



12239.00 :: Needham Street  
26: I-95 NB Ramps & Highland Avenue  
Timing Plan: Saturday Midday

| Intersection             |        |      |       |        |      |       |        |       |       |        |      |       |  |
|--------------------------|--------|------|-------|--------|------|-------|--------|-------|-------|--------|------|-------|--|
| Int Delay, s/veh         | 1.7    |      |       |        |      |       |        |       |       |        |      |       |  |
| Movement                 | EBL    | EBT  | EBR   | WBL    | WBT  | WBR   | NBL    | NBT   | NBR   | SBL    | SBT  | SBR   |  |
| Lane Configurations      |        | ↕↕   | ↕     |        | ↕↕   |       |        |       | ↕     |        |      | ↕     |  |
| Traffic Vol, veh/h       | 0      | 765  | 395   | 0      | 970  | 545   | 0      | 0     | 245   | 0      | 0    | 85    |  |
| Future Vol, veh/h        | 0      | 765  | 395   | 0      | 970  | 545   | 0      | 0     | 245   | 0      | 0    | 85    |  |
| Conflicting Peds, #/hr   | 0      | 0    | 2     | 0      | 0    | 0     | 0      | 0     | 2     | 0      | 0    | 0     |  |
| Sign Control             | Free   | Free | Free  | Free   | Free | Free  | Stop   | Stop  | Stop  | Stop   | Stop | Stop  |  |
| RT Channelized           | -      | -    | Yield | -      | -    | Yield | -      | -     | Yield | -      | -    | Yield |  |
| Storage Length           | -      | -    | 0     | -      | -    | -     | -      | -     | 0     | -      | -    | 0     |  |
| Veh in Median Storage, # | -      | 0    | -     | -      | 0    | -     | -      | 0     | -     | -      | 0    | -     |  |
| Grade, %                 | -      | 0    | -     | -      | 0    | -     | -      | 0     | -     | -      | 0    | -     |  |
| Peak Hour Factor         | 92     | 92   | 92    | 92     | 92   | 92    | 92     | 92    | 92    | 92     | 92   | 92    |  |
| Heavy Vehicles, %        | 0      | 0    | 0     | 1      | 1    | 1     | 1      | 1     | 1     | 0      | 0    | 0     |  |
| Mvmt Flow                | 0      | 832  | 429   | 0      | 1054 | 592   | 0      | 0     | 266   | 0      | 0    | 92    |  |
| Major/Minor              | Major1 |      |       | Major2 |      |       | Minor1 |       |       | Minor2 |      |       |  |
| Conflicting Flow All     | -      | 0    | 0     | -      | -    | 0     | -      | -     | 420   | -      | -    | 527   |  |
| Stage 1                  | -      | -    | -     | -      | -    | -     | -      | -     | -     | -      | -    | -     |  |
| Stage 2                  | -      | -    | -     | -      | -    | -     | -      | -     | -     | -      | -    | -     |  |
| Critical Hdwy            | -      | -    | -     | -      | -    | -     | -      | -     | 6.92  | -      | -    | 6.9   |  |
| Critical Hdwy Stg 1      | -      | -    | -     | -      | -    | -     | -      | -     | -     | -      | -    | -     |  |
| Critical Hdwy Stg 2      | -      | -    | -     | -      | -    | -     | -      | -     | -     | -      | -    | -     |  |
| Follow-up Hdwy           | -      | -    | -     | -      | -    | -     | -      | -     | 3.31  | -      | -    | 3.3   |  |
| Pot Cap-1 Maneuver       | 0      | -    | 0     | -      | -    | 0     | 0      | 585   | 0     | 0      | 501  |       |  |
| Stage 1                  | 0      | -    | 0     | -      | -    | 0     | 0      | 0     | -     | 0      | 0    | -     |  |
| Stage 2                  | 0      | -    | 0     | -      | -    | 0     | 0      | 0     | -     | 0      | 0    | -     |  |
| Platoon blocked, %       | -      | -    | -     | -      | -    | -     | -      | -     | 583   | -      | -    | 501   |  |
| Mov Cap-1 Maneuver       | -      | -    | -     | -      | -    | -     | -      | -     | -     | -      | -    | -     |  |
| Mov Cap-2 Maneuver       | -      | -    | -     | -      | -    | -     | -      | -     | -     | -      | -    | -     |  |
| Stage 1                  | -      | -    | -     | -      | -    | -     | -      | -     | -     | -      | -    | -     |  |
| Stage 2                  | -      | -    | -     | -      | -    | -     | -      | -     | -     | -      | -    | -     |  |
| Approach                 | EB     |      |       | WB     |      |       | NB     |       |       | SB     |      |       |  |
| HCM Control Delay, s     | 0      |      |       | 0      |      |       | 16.3   |       |       | 13.8   |      |       |  |
| HCM LOS                  |        |      |       |        |      |       | C      |       |       | B      |      |       |  |
| Minor Lane/Major Mvmt    | NBLn1  |      |       | EBT    | EBR  | WBT   | WBR    | SBLn1 |       |        |      |       |  |
| Capacity (veh/h)         | 583    |      |       | -      | -    | -     | -      | 501   |       |        |      |       |  |
| HCM Lane V/C Ratio       | 0.457  |      |       | -      | -    | -     | -      | 0.184 |       |        |      |       |  |
| HCM Control Delay (s)    | 16.3   |      |       | -      | -    | -     | -      | 13.8  |       |        |      |       |  |
| HCM Lane LOS             | C      |      |       | -      | -    | -     | -      | B     |       |        |      |       |  |
| HCM 95th %ile Q(veh)     | 2.4    |      |       | -      | -    | -     | -      | 0.7   |       |        |      |       |  |

12239.00 :: Needham Street  
27: I-95 SB Ramps & Highland Avenue

2025 Build Conditions without Shuttle Service  
Timing Plan: Saturday MIDDAY

| Intersection             |        |      |       |        |      |       |        |      |       |        |      |       |
|--------------------------|--------|------|-------|--------|------|-------|--------|------|-------|--------|------|-------|
| Int Delay, s/veh         | 8.5    |      |       |        |      |       |        |      |       |        |      |       |
| Movement                 | EBL    | EBT  | EBR   | WBL    | WBT  | WBR   | NBL    | NBT  | NBR   | SBL    | SBT  | SBR   |
| Lane Configurations      |        | ↑↑   |       |        | ↑↑   | ↑     |        |      | ↑     |        |      | ↑     |
| Traffic Vol, veh/h       | 0      | 760  | 155   | 0      | 750  | 305   | 0      | 0    | 400   | 0      | 0    | 435   |
| Future Vol, veh/h        | 0      | 760  | 155   | 0      | 750  | 305   | 0      | 0    | 400   | 0      | 0    | 435   |
| Conflicting Peds, #/hr   | 0      | 0    | 2     | 2      | 0    | 0     | 0      | 0    | 2     | 0      | 0    | 0     |
| Sign Control             | Free   | Free | Free  | Free   | Free | Free  | Stop   | Stop | Stop  | Stop   | Stop | Stop  |
| RT Channelized           | -      | -    | Yield | -      | -    | Yield | -      | -    | Yield | -      | -    | Yield |
| Storage Length           | -      | -    | -     | -      | -    | 0     | -      | -    | 0     | -      | -    | 0     |
| Veh in Median Storage, # | -      | 0    | -     | -      | 0    | -     | -      | -    | 0     | -      | -    | 0     |
| Grade, %                 | -      | 0    | -     | -      | 0    | -     | -      | 0    | -     | -      | 0    | -     |
| Peak Hour Factor         | 92     | 92   | 92    | 92     | 92   | 92    | 92     | 92   | 92    | 92     | 92   | 92    |
| Heavy Vehicles, %        | 0      | 0    | 0     | 1      | 1    | 1     | 1      | 1    | 1     | 0      | 0    | 0     |
| Mvmt Flow                | 0      | 826  | 168   | 0      | 815  | 332   | 0      | 0    | 435   | 0      | 0    | 473   |
| Major/Minor              | Major1 |      |       | Major2 |      |       | Minor1 |      |       | Minor2 |      |       |
| Conflicting Flow All     | -      | 0    | 0     | -      | -    | 0     | -      | -    | 417   | -      | -    | 408   |
| Stage 1                  | -      | -    | -     | -      | -    | -     | -      | -    | -     | -      | -    | -     |
| Stage 2                  | -      | -    | -     | -      | -    | -     | -      | -    | -     | -      | -    | -     |
| Critical Hdwy            | -      | -    | -     | -      | -    | -     | -      | -    | 6.92  | -      | -    | 6.9   |
| Critical Hdwy Stg 1      | -      | -    | -     | -      | -    | -     | -      | -    | -     | -      | -    | -     |
| Critical Hdwy Stg 2      | -      | -    | -     | -      | -    | -     | -      | -    | -     | -      | -    | -     |
| Follow-up Hdwy           | -      | -    | -     | -      | -    | -     | -      | -    | 3.31  | -      | -    | 3.3   |
| Pot Cap-1 Maneuver       | 0      | -    | -     | 0      | -    | -     | 0      | 0    | 587   | 0      | 0    | 598   |
| Stage 1                  | 0      | -    | -     | 0      | -    | -     | 0      | 0    | -     | 0      | 0    | -     |
| Stage 2                  | 0      | -    | -     | 0      | -    | -     | 0      | 0    | -     | 0      | 0    | -     |
| Platoon blocked, %       | -      | -    | -     | -      | -    | -     | -      | -    | 585   | -      | -    | 598   |
| Mov Cap-1 Maneuver       | -      | -    | -     | -      | -    | -     | -      | -    | -     | -      | -    | -     |
| Mov Cap-2 Maneuver       | -      | -    | -     | -      | -    | -     | -      | -    | -     | -      | -    | -     |
| Stage 1                  | -      | -    | -     | -      | -    | -     | -      | -    | -     | -      | -    | -     |
| Stage 2                  | -      | -    | -     | -      | -    | -     | -      | -    | -     | -      | -    | -     |
| Approach                 | EB     |      |       | WB     |      |       | NB     |      |       | SB     |      |       |
| HCM Control Delay, s     | 0      |      |       | 0      |      |       | 26.8   |      |       | 30     |      |       |
| HCM LOS                  |        |      |       |        |      |       | D      |      |       | D      |      |       |
| Minor Lane/Major Mvmt    | NBLn1  |      | EBT   | EBR    | WBT  | WBR   | SBLn1  |      |       |        |      |       |
| Capacity (veh/h)         | 585    |      | -     | -      | -    | -     | 598    |      |       |        |      |       |
| HCM Lane V/C Ratio       | 0.743  |      | -     | -      | -    | -     | 0.791  |      |       |        |      |       |
| HCM Control Delay (s)    | 26.8   |      | -     | -      | -    | -     | 30     |      |       |        |      |       |
| HCM Lane LOS             | D      |      | -     | -      | -    | -     | D      |      |       |        |      |       |
| HCM 95th %tile Q(veh)    | 6.5    |      | -     | -      | -    | -     | 7.6    |      |       |        |      |       |



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## Mitigation Intersection Capacity Analyses – With Robust Shuttle Service





**Table A-3 Signalized Intersection Capacity Analysis with Mitigation**

| Location /<br>Movement                    | 2025 No-Build Condition |                  |                  |                   |                   | 2025 Build Condition<br>(with Robust Shuttle Service) |           |          |      |      | 2025 Build Condition w/ Mitigation<br>(with Robust Shuttle Service) |           |          |      |      |
|-------------------------------------------|-------------------------|------------------|------------------|-------------------|-------------------|-------------------------------------------------------|-----------|----------|------|------|---------------------------------------------------------------------|-----------|----------|------|------|
|                                           | v/c <sup>a</sup>        | Del <sup>b</sup> | LOS <sup>c</sup> | 50 Q <sup>d</sup> | 95 Q <sup>e</sup> | v/c                                                   | Del       | LOS      | 50 Q | 95 Q | v/c                                                                 | Del       | LOS      | 50 Q | 95 Q |
| <b>3: Chestnut Street at Eliot Street</b> |                         |                  |                  |                   |                   |                                                       |           |          |      |      |                                                                     |           |          |      |      |
| <i>Weekday Morning</i>                    |                         |                  |                  |                   |                   |                                                       |           |          |      |      |                                                                     |           |          |      |      |
| EB L/T/R                                  | 1.10                    | 89               | F                | ~326              | #805              | 1.11                                                  | 93        | F        | ~333 | #805 | 0.94                                                                | 45        | D        | 400  | #876 |
| WB L/T/R                                  | 0.13                    | 11               | B                | 13                | 61                | 0.13                                                  | 11        | B        | 14   | 61   | 0.11                                                                | 10        | A        | 20   | 63   |
| NB L/T/R                                  | 0.47                    | 21               | C                | 68                | 177               | 0.48                                                  | 22        | C        | 74   | 190  | 0.54                                                                | 34        | C        | 130  | 265  |
| SB L/T/R                                  | 0.82                    | 32               | C                | 157               | #424              | 0.82                                                  | 32        | C        | 161  | #433 | 0.86                                                                | 47        | D        | 287  | #609 |
| <b>Total</b>                              |                         | <b>56</b>        | <b>E</b>         |                   |                   |                                                       | <b>57</b> | <b>E</b> |      |      |                                                                     | <b>42</b> | <b>D</b> |      |      |
| <i>Weekday Evening</i>                    |                         |                  |                  |                   |                   |                                                       |           |          |      |      |                                                                     |           |          |      |      |
| EB L/T/R                                  | 1.13                    | 114              | F                | ~329              | #686              | >1.20                                                 | >120      | F        | ~356 | #696 | 1.02                                                                | 78        | E        | 313  | #678 |
| WB L/T/R                                  | 0.43                    | 27               | C                | 110               | 241               | 0.46                                                  | 29        | C        | 115  | 241  | 0.39                                                                | 26        | C        | 117  | 240  |
| NB L/T/R                                  | 0.61                    | 22               | C                | 128               | 313               | 0.61                                                  | 21        | C        | 142  | 346  | 0.71                                                                | 31        | C        | 191  | #455 |
| SB L/T/R                                  | 0.87                    | 31               | C                | 290               | #717              | 0.86                                                  | 31        | C        | 322  | #781 | 0.94                                                                | 45        | D        | 422  | #893 |
| <b>Total</b>                              |                         | <b>51</b>        | <b>D</b>         |                   |                   |                                                       | <b>62</b> | <b>E</b> |      |      |                                                                     | <b>48</b> | <b>D</b> |      |      |
| <i>Saturday Midday</i>                    |                         |                  |                  |                   |                   |                                                       |           |          |      |      |                                                                     |           |          |      |      |
| EB L/T/R                                  | 0.82                    | 39               | D                | 140               | #402              | 0.83                                                  | 40        | D        | 140  | #403 | 0.85                                                                | 46        | D        | 149  | #504 |
| WB L/T/R                                  | 0.31                    | 17               | B                | 48                | 133               | 0.31                                                  | 17        | B        | 48   | 133  | 0.32                                                                | 22        | C        | 52   | 167  |
| NB L/T/R                                  | 0.63                    | 28               | C                | 101               | #288              | 0.72                                                  | 32        | C        | 123  | #356 | 0.68                                                                | 26        | C        | 111  | 286  |
| SB L/T/R                                  | 0.83                    | 35               | C                | 193               | #522              | 0.90                                                  | 42        | D        | 225  | #598 | 0.87                                                                | 34        | C        | 204  | #538 |
| <b>Total</b>                              |                         | <b>32</b>        | <b>C</b>         |                   |                   |                                                       | <b>36</b> | <b>D</b> |      |      |                                                                     | <b>34</b> | <b>C</b> |      |      |
| <b>17: Centre Street at Walnut Street</b> |                         |                  |                  |                   |                   |                                                       |           |          |      |      |                                                                     |           |          |      |      |
| <i>Weekday Morning</i>                    |                         |                  |                  |                   |                   |                                                       |           |          |      |      |                                                                     |           |          |      |      |
| SEB L/T                                   | 0.16                    | 45               | D                | 14                | 40                | 0.16                                                  | 45        | D        | 14   | 40   | 0.20                                                                | 50        | D        | 15   | 42   |
| SEB R                                     | 0.84                    | 47               | D                | 256               | #450              | 0.86                                                  | 49        | D        | 261  | #460 | 0.93                                                                | 64        | E        | 285  | #515 |
| NWB L/T/R                                 | 0.47                    | 53               | D                | 52                | 101               | 0.47                                                  | 53        | D        | 52   | 101  | 0.54                                                                | 61        | E        | 56   | #114 |
| NEB L                                     | 0.81                    | 33               | C                | 170               | #374              | 0.84                                                  | 35        | D        | 180  | #395 | 0.81                                                                | 29        | C        | 163  | #344 |
| NEB T/R                                   | 0.59                    | 15               | B                | 279               | 448               | 0.60                                                  | 15        | B        | 293  | 471  | 0.58                                                                | 13        | B        | 297  | 418  |
| SWB L/T/R                                 | 1.04                    | 72               | E                | ~627              | #915              | 1.04                                                  | 74        | E        | ~634 | #924 | 0.95                                                                | 51        | D        | ~628 | #870 |
| <b>Total</b>                              |                         | <b>44</b>        | <b>D</b>         |                   |                   |                                                       | <b>45</b> | <b>D</b> |      |      |                                                                     | <b>39</b> | <b>D</b> |      |      |
| <i>Weekday Evening</i>                    |                         |                  |                  |                   |                   |                                                       |           |          |      |      |                                                                     |           |          |      |      |
| SEB L/T                                   | 0.25                    | 48               | D                | 22                | 54                | 0.25                                                  | 48        | D        | 22   | 54   | 0.29                                                                | 53        | D        | 24   | 57   |
| SEB R                                     | 0.93                    | 59               | E                | ~294              | #510              | 0.97                                                  | 68        | E        | ~335 | #546 | 0.98                                                                | 71        | E        | ~351 | #574 |
| NWB L/T/R                                 | 0.40                    | 50               | D                | 45                | 89                | 0.40                                                  | 50        | D        | 45   | 89   | 0.44                                                                | 56        | E        | 48   | 95   |
| NEB L                                     | 0.82                    | 29               | C                | 166               | #371              | 0.87                                                  | 36        | D        | 191  | #414 | 0.82                                                                | 30        | C        | 185  | #380 |
| NEB T/R                                   | 0.51                    | 12               | B                | 219               | 343               | 0.53                                                  | 12        | B        | 234  | 365  | 0.51                                                                | 11        | B        | 233  | 337  |
| SWB L/T/R                                 | 0.93                    | 49               | D                | ~482              | #770              | 0.98                                                  | 59        | E        | ~558 | #828 | 0.95                                                                | 51        | D        | ~570 | #818 |
| <b>Total</b>                              |                         | <b>37</b>        | <b>D</b>         |                   |                   |                                                       | <b>43</b> | <b>D</b> |      |      |                                                                     | <b>40</b> | <b>D</b> |      |      |
| <i>Saturday Midday</i>                    |                         |                  |                  |                   |                   |                                                       |           |          |      |      |                                                                     |           |          |      |      |
| SEB L/T                                   | 0.33                    | 47               | D                | 22                | 64                | 0.33                                                  | 47        | D        | 22   | 64   | 0.30                                                                | 37        | D        | 17   | 58   |
| SEB R                                     | 0.72                    | 35               | D                | 156               | #352              | 0.77                                                  | 38        | D        | 170  | #412 | 0.72                                                                | 29        | C        | 128  | #388 |
| NWB L/T/R                                 | 0.71                    | 61               | E                | 80                | #192              | 0.71                                                  | 61        | E        | 80   | #192 | 0.68                                                                | 50        | D        | 63   | #189 |
| NEB L                                     | 0.72                    | 17               | B                | 73                | #293              | 0.79                                                  | 22        | C        | 79   | #369 | 0.80                                                                | 23        | C        | 78   | #375 |
| NEB T/R                                   | 0.29                    | 8                | A                | 55                | 178               | 0.32                                                  | 9         | A        | 63   | 203  | 0.32                                                                | 7         | A        | 53   | 188  |
| SWB L/T/R                                 | 0.67                    | 29               | C                | 215               | 459               | 0.73                                                  | 31        | C        | 245  | #560 | 0.80                                                                | 32        | C        | 212  | #542 |
| <b>Total</b>                              |                         | <b>26</b>        | <b>C</b>         |                   |                   |                                                       | <b>29</b> | <b>C</b> |      |      |                                                                     | <b>25</b> | <b>C</b> |      |      |

a Volume to capacity ratio.

b Average total delay, in seconds per vehicle.

c Level-of-service.

d 50th percentile queue, in feet.

e 95th percentile queue, in feet.

~ Volume exceeds capacity, queue is theoretically infinite.

# 95th percentile volume exceeds capacity, queue may be longer.



|                         |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|-------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
| Lane Group              | EBL                                                                               | EBT                                                                               | EBR                                                                               | WBL                                                                               | WBT                                                                               | WBR                                                                               | NBL                                                                               | NBT                                                                               | NBR                                                                               | SBL                                                                                 | SBT                                                                                 | SBR                                                                                 | Ø3                                                                                  |                                                                                     |                                                                                     |                                                                                     |
| Lane Configurations     |                                                                                   |  |                                                                                   |                                                                                   |  |                                                                                   |                                                                                   |  |                                                                                   |                                                                                     |  |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Traffic Volume (vph)    | 370                                                                               | 270                                                                               | 40                                                                                | 5                                                                                 | 55                                                                                | 35                                                                                | 40                                                                                | 195                                                                               | 5                                                                                 | 30                                                                                  | 275                                                                                 | 170                                                                                 |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Future Volume (vph)     | 370                                                                               | 270                                                                               | 40                                                                                | 5                                                                                 | 55                                                                                | 35                                                                                | 40                                                                                | 195                                                                               | 5                                                                                 | 30                                                                                  | 275                                                                                 | 170                                                                                 |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Ideal Flow (vphpl)      | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                                | 1900                                                                                | 1900                                                                                |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Satd. Flow (prot)       | 0                                                                                 | 1832                                                                              | 0                                                                                 | 0                                                                                 | 1801                                                                              | 0                                                                                 | 0                                                                                 | 1842                                                                              | 0                                                                                 | 0                                                                                   | 1789                                                                                | 0                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Flt Permitted           |                                                                                   | 0.781                                                                             |                                                                                   |                                                                                   | 0.973                                                                             |                                                                                   |                                                                                   | 0.765                                                                             |                                                                                   |                                                                                     | 0.966                                                                               |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Satd. Flow (perm)       | 0                                                                                 | 1470                                                                              | 0                                                                                 | 0                                                                                 | 1756                                                                              | 0                                                                                 | 0                                                                                 | 1420                                                                              | 0                                                                                 | 0                                                                                   | 1734                                                                                | 0                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Right Turn on Red       |                                                                                   |                                                                                   | Yes                                                                               |                                                                                   |                                                                                   | Yes                                                                               |                                                                                   |                                                                                   | Yes                                                                               |                                                                                     |                                                                                     | Yes                                                                                 |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Satd. Flow (RTOR)       |                                                                                   | 3                                                                                 |                                                                                   |                                                                                   | 32                                                                                |                                                                                   |                                                                                   | 1                                                                                 |                                                                                   |                                                                                     | 24                                                                                  |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Link Speed (mph)        |                                                                                   | 30                                                                                |                                                                                   |                                                                                   | 30                                                                                |                                                                                   |                                                                                   | 30                                                                                |                                                                                   |                                                                                     | 30                                                                                  |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Link Distance (ft)      |                                                                                   | 764                                                                               |                                                                                   |                                                                                   | 972                                                                               |                                                                                   |                                                                                   | 2055                                                                              |                                                                                   |                                                                                     | 1553                                                                                |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Travel Time (s)         |                                                                                   | 17.4                                                                              |                                                                                   |                                                                                   | 22.1                                                                              |                                                                                   |                                                                                   | 46.7                                                                              |                                                                                   |                                                                                     | 35.3                                                                                |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Confl. Peds. (#/hr)     |                                                                                   |                                                                                   | 1                                                                                 | 1                                                                                 |                                                                                   |                                                                                   | 1                                                                                 |                                                                                   | 1                                                                                 | 1                                                                                   |                                                                                     | 1                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Peak Hour Factor        | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                                | 0.92                                                                                | 0.92                                                                                |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Heavy Vehicles (%)      | 0%                                                                                | 0%                                                                                | 0%                                                                                | 0%                                                                                | 0%                                                                                | 0%                                                                                | 2%                                                                                | 2%                                                                                | 2%                                                                                | 0%                                                                                  | 0%                                                                                  | 0%                                                                                  |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Shared Lane Traffic (%) |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Lane Group Flow (vph)   | 0                                                                                 | 738                                                                               | 0                                                                                 | 0                                                                                 | 103                                                                               | 0                                                                                 | 0                                                                                 | 260                                                                               | 0                                                                                 | 0                                                                                   | 517                                                                                 | 0                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Turn Type               | Perm                                                                              | NA                                                                                |                                                                                   | Perm                                                                              | NA                                                                                |                                                                                   | Perm                                                                              | NA                                                                                |                                                                                   | Perm                                                                                | NA                                                                                  |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Protected Phases        |                                                                                   | 1                                                                                 |                                                                                   |                                                                                   | 1                                                                                 |                                                                                   |                                                                                   | 2                                                                                 |                                                                                   |                                                                                     | 2                                                                                   |                                                                                     | 3                                                                                   |                                                                                     |                                                                                     |                                                                                     |
| Permitted Phases        | 1                                                                                 |                                                                                   |                                                                                   | 1                                                                                 |                                                                                   |                                                                                   | 2                                                                                 |                                                                                   |                                                                                   | 2                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Detector Phase          | 1                                                                                 | 1                                                                                 |                                                                                   | 1                                                                                 | 1                                                                                 |                                                                                   | 2                                                                                 | 2                                                                                 |                                                                                   | 2                                                                                   | 2                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Switch Phase            |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Minimum Initial (s)     | 6.0                                                                               | 6.0                                                                               |                                                                                   | 6.0                                                                               | 6.0                                                                               |                                                                                   | 6.0                                                                               | 6.0                                                                               |                                                                                   | 6.0                                                                                 | 6.0                                                                                 |                                                                                     | 4.0                                                                                 |                                                                                     |                                                                                     |                                                                                     |
| Minimum Split (s)       | 11.0                                                                              | 11.0                                                                              |                                                                                   | 11.0                                                                              | 11.0                                                                              |                                                                                   | 11.0                                                                              | 11.0                                                                              |                                                                                   | 11.0                                                                                | 11.0                                                                                |                                                                                     | 19.0                                                                                |                                                                                     |                                                                                     |                                                                                     |
| Total Split (s)         | 60.0                                                                              | 60.0                                                                              |                                                                                   | 60.0                                                                              | 60.0                                                                              |                                                                                   | 40.0                                                                              | 40.0                                                                              |                                                                                   | 40.0                                                                                | 40.0                                                                                |                                                                                     | 20.0                                                                                |                                                                                     |                                                                                     |                                                                                     |
| Total Split (%)         | 50.0%                                                                             | 50.0%                                                                             |                                                                                   | 50.0%                                                                             | 50.0%                                                                             |                                                                                   | 33.3%                                                                             | 33.3%                                                                             |                                                                                   | 33.3%                                                                               | 33.3%                                                                               |                                                                                     | 17%                                                                                 |                                                                                     |                                                                                     |                                                                                     |
| Yellow Time (s)         | 3.0                                                                               | 3.0                                                                               |                                                                                   | 3.0                                                                               | 3.0                                                                               |                                                                                   | 3.0                                                                               | 3.0                                                                               |                                                                                   | 3.0                                                                                 | 3.0                                                                                 |                                                                                     | 3.0                                                                                 |                                                                                     |                                                                                     |                                                                                     |
| All-Red Time (s)        | 2.0                                                                               | 2.0                                                                               |                                                                                   | 2.0                                                                               | 2.0                                                                               |                                                                                   | 2.0                                                                               | 2.0                                                                               |                                                                                   | 2.0                                                                                 | 2.0                                                                                 |                                                                                     | 1.0                                                                                 |                                                                                     |                                                                                     |                                                                                     |
| Lost Time Adjust (s)    |                                                                                   | 0.0                                                                               |                                                                                   |                                                                                   | 0.0                                                                               |                                                                                   |                                                                                   | 0.0                                                                               |                                                                                   |                                                                                     | 0.0                                                                                 |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Total Lost Time (s)     |                                                                                   | 5.0                                                                               |                                                                                   |                                                                                   | 5.0                                                                               |                                                                                   |                                                                                   | 5.0                                                                               |                                                                                   |                                                                                     | 5.0                                                                                 |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Lead/Lag                | Lead                                                                              | Lead                                                                              |                                                                                   | Lead                                                                              | Lead                                                                              |                                                                                   | Lag                                                                               | Lag                                                                               |                                                                                   | Lag                                                                                 | Lag                                                                                 |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Lead-Lag Optimize?      |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Recall Mode             | None                                                                              | None                                                                              |                                                                                   | None                                                                              | None                                                                              |                                                                                   | None                                                                              | None                                                                              |                                                                                   | None                                                                                | None                                                                                |                                                                                     | None                                                                                |                                                                                     |                                                                                     |                                                                                     |
| Act Effect Green (s)    |                                                                                   | 55.3                                                                              |                                                                                   |                                                                                   | 55.3                                                                              |                                                                                   |                                                                                   | 34.8                                                                              |                                                                                   |                                                                                     | 34.8                                                                                |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Actuated g/C Ratio      |                                                                                   | 0.53                                                                              |                                                                                   |                                                                                   | 0.53                                                                              |                                                                                   |                                                                                   | 0.34                                                                              |                                                                                   |                                                                                     | 0.34                                                                                |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| v/c Ratio               |                                                                                   | 0.94                                                                              |                                                                                   |                                                                                   | 0.11                                                                              |                                                                                   |                                                                                   | 0.54                                                                              |                                                                                   |                                                                                     | 0.86                                                                                |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Control Delay           |                                                                                   | 44.8                                                                              |                                                                                   |                                                                                   | 10.0                                                                              |                                                                                   |                                                                                   | 34.2                                                                              |                                                                                   |                                                                                     | 47.4                                                                                |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Queue Delay             |                                                                                   | 0.0                                                                               |                                                                                   |                                                                                   | 0.0                                                                               |                                                                                   |                                                                                   | 0.0                                                                               |                                                                                   |                                                                                     | 0.0                                                                                 |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Total Delay             |                                                                                   | 44.8                                                                              |                                                                                   |                                                                                   | 10.0                                                                              |                                                                                   |                                                                                   | 34.2                                                                              |                                                                                   |                                                                                     | 47.4                                                                                |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| LOS                     |                                                                                   | D                                                                                 |                                                                                   |                                                                                   | A                                                                                 |                                                                                   |                                                                                   | C                                                                                 |                                                                                   |                                                                                     | D                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Approach Delay          |                                                                                   | 44.8                                                                              |                                                                                   |                                                                                   | 10.0                                                                              |                                                                                   |                                                                                   | 34.2                                                                              |                                                                                   |                                                                                     | 47.4                                                                                |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Approach LOS            |                                                                                   | D                                                                                 |                                                                                   |                                                                                   | A                                                                                 |                                                                                   |                                                                                   | C                                                                                 |                                                                                   |                                                                                     | D                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Queue Length 50th (ft)  |                                                                                   | 400                                                                               |                                                                                   |                                                                                   | 20                                                                                |                                                                                   |                                                                                   | 130                                                                               |                                                                                   |                                                                                     | 287                                                                                 |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Queue Length 95th (ft)  |                                                                                   | #876                                                                              |                                                                                   |                                                                                   | 63                                                                                |                                                                                   |                                                                                   | 265                                                                               |                                                                                   |                                                                                     | #609                                                                                |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Internal Link Dist (ft) |                                                                                   | 684                                                                               |                                                                                   |                                                                                   | 892                                                                               |                                                                                   |                                                                                   | 1975                                                                              |                                                                                   |                                                                                     | 1473                                                                                |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Turn Bay Length (ft)    |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Base Capacity (vph)     |                                                                                   | 786                                                                               |                                                                                   |                                                                                   | 953                                                                               |                                                                                   |                                                                                   | 483                                                                               |                                                                                   |                                                                                     | 605                                                                                 |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Starvation Cap Reductn  |                                                                                   | 0                                                                                 |                                                                                   |                                                                                   | 0                                                                                 |                                                                                   |                                                                                   | 0                                                                                 |                                                                                   |                                                                                     | 0                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Spillback Cap Reductn   |                                                                                   | 0                                                                                 |                                                                                   |                                                                                   | 0                                                                                 |                                                                                   |                                                                                   | 0                                                                                 |                                                                                   |                                                                                     | 0                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Storage Cap Reductn     |                                                                                   | 0                                                                                 |                                                                                   |                                                                                   | 0                                                                                 |                                                                                   |                                                                                   | 0                                                                                 |                                                                                   |                                                                                     | 0                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Reduced v/c Ratio       |                                                                                   | 0.94                                                                              |                                                                                   |                                                                                   | 0.11                                                                              |                                                                                   |                                                                                   | 0.54                                                                              |                                                                                   |                                                                                     | 0.85                                                                                |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |

#### Intersection Summary

Area Type: Other

Cycle Length: 120

Actuated Cycle Length: 103.5

Natural Cycle: 130

Control Type: Actuated-Uncoordinated

Maximum v/c Ratio: 0.94

Intersection Signal Delay: 41.7

Intersection LOS: D

Intersection Capacity Utilization 81.5%

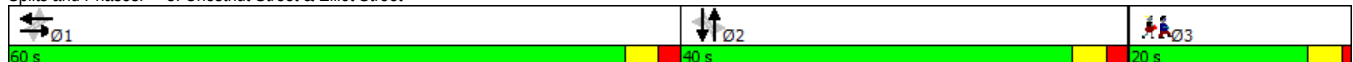
ICU Level of Service D

Analysis Period (min) 15

# 95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

Splits and Phases: 3: Chestnut Street & Elliot Street



| Lane Group              | SEL   | SET                                                                               | SER                                                                               | NWL   | NWT                                                                               | NWR  | NEL                                                                               | NET                                                                               | NER  | SWL   | SWT                                                                                 | SWR  | Ø3   |
|-------------------------|-------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-------|-----------------------------------------------------------------------------------|------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|------|-------|-------------------------------------------------------------------------------------|------|------|
| Lane Configurations     |       |  |  |       |  |      |  |  |      |       |  |      |      |
| Traffic Volume (vph)    | 20    | 1                                                                                 | 400                                                                               | 35    | 40                                                                                | 0    | 395                                                                               | 700                                                                               | 2    | 1     | 725                                                                                 | 30   |      |
| Future Volume (vph)     | 20    | 1                                                                                 | 400                                                                               | 35    | 40                                                                                | 0    | 395                                                                               | 700                                                                               | 2    | 1     | 725                                                                                 | 30   |      |
| Ideal Flow (vphpl)      | 1900  | 1900                                                                              | 1900                                                                              | 1900  | 1900                                                                              | 1900 | 1900                                                                              | 1900                                                                              | 1900 | 1900  | 1900                                                                                | 1900 |      |
| Storage Length (ft)     | 0     |                                                                                   | 50                                                                                | 0     |                                                                                   | 0    | 75                                                                                |                                                                                   | 0    | 0     |                                                                                     | 0    |      |
| Storage Lanes           | 0     |                                                                                   | 1                                                                                 | 0     |                                                                                   | 0    | 1                                                                                 |                                                                                   | 0    | 0     |                                                                                     | 0    |      |
| Taper Length (ft)       | 25    |                                                                                   |                                                                                   | 25    |                                                                                   |      | 25                                                                                |                                                                                   |      | 25    |                                                                                     |      |      |
| Satd. Flow (prot)       | 0     | 1813                                                                              | 1615                                                                              | 0     | 1856                                                                              | 0    | 1770                                                                              | 1863                                                                              | 0    | 0     | 1889                                                                                | 0    |      |
| Flt Permitted           |       | 0.692                                                                             |                                                                                   |       | 0.839                                                                             |      | 0.213                                                                             |                                                                                   |      |       |                                                                                     |      |      |
| Satd. Flow (perm)       | 0     | 1230                                                                              | 1571                                                                              | 0     | 1578                                                                              | 0    | 397                                                                               | 1863                                                                              | 0    | 0     | 1889                                                                                | 0    |      |
| Right Turn on Red       |       |                                                                                   | No                                                                                |       |                                                                                   | No   |                                                                                   |                                                                                   | Yes  |       |                                                                                     | Yes  |      |
| Satd. Flow (RTOR)       |       |                                                                                   |                                                                                   |       |                                                                                   |      |                                                                                   |                                                                                   |      |       | 2                                                                                   |      |      |
| Link Speed (mph)        |       | 30                                                                                |                                                                                   |       | 30                                                                                |      |                                                                                   | 30                                                                                |      |       | 30                                                                                  |      |      |
| Link Distance (ft)      |       | 624                                                                               |                                                                                   |       | 387                                                                               |      |                                                                                   | 508                                                                               |      |       | 531                                                                                 |      |      |
| Travel Time (s)         |       | 14.2                                                                              |                                                                                   |       | 8.8                                                                               |      |                                                                                   | 11.5                                                                              |      |       | 12.1                                                                                |      |      |
| Confl. Peds. (#/hr)     | 17    |                                                                                   | 4                                                                                 | 4     |                                                                                   | 17   | 3                                                                                 |                                                                                   | 9    | 9     |                                                                                     | 3    |      |
| Peak Hour Factor        | 0.92  | 0.92                                                                              | 0.92                                                                              | 0.92  | 0.92                                                                              | 0.92 | 0.92                                                                              | 0.92                                                                              | 0.92 | 0.92  | 0.92                                                                                | 0.92 |      |
| Heavy Vehicles (%)      | 0%    | 0%                                                                                | 0%                                                                                | 0%    | 0%                                                                                | 0%   | 2%                                                                                | 2%                                                                                | 2%   | 0%    | 0%                                                                                  | 0%   |      |
| Shared Lane Traffic (%) |       |                                                                                   |                                                                                   |       |                                                                                   |      |                                                                                   |                                                                                   |      |       |                                                                                     |      |      |
| Lane Group Flow (vph)   | 0     | 23                                                                                | 435                                                                               | 0     | 81                                                                                | 0    | 429                                                                               | 763                                                                               | 0    | 0     | 822                                                                                 | 0    |      |
| Turn Type               | Perm  | NA                                                                                | pm+ov                                                                             | Perm  | NA                                                                                |      | D,P+P                                                                             | NA                                                                                |      | Perm  | NA                                                                                  |      |      |
| Protected Phases        |       | 4                                                                                 | 1                                                                                 |       | 4                                                                                 |      | 1                                                                                 | 1 2                                                                               |      |       | 2                                                                                   |      | 3    |
| Permitted Phases        | 4     |                                                                                   | 4                                                                                 | 4     |                                                                                   |      | 2                                                                                 |                                                                                   |      | 2     |                                                                                     |      |      |
| Detector Phase          | 4     | 4                                                                                 | 1                                                                                 | 4     | 4                                                                                 |      | 1                                                                                 | 1 2                                                                               |      | 2     | 2                                                                                   |      |      |
| Switch Phase            |       |                                                                                   |                                                                                   |       |                                                                                   |      |                                                                                   |                                                                                   |      |       |                                                                                     |      |      |
| Minimum Initial (s)     | 9.0   | 9.0                                                                               | 7.0                                                                               | 9.0   | 9.0                                                                               |      | 7.0                                                                               |                                                                                   |      | 6.0   | 6.0                                                                                 |      | 4.0  |
| Minimum Split (s)       | 14.0  | 14.0                                                                              | 12.0                                                                              | 14.0  | 14.0                                                                              |      | 12.0                                                                              |                                                                                   |      | 11.0  | 11.0                                                                                |      | 19.0 |
| Total Split (s)         | 15.0  | 15.0                                                                              | 25.0                                                                              | 15.0  | 15.0                                                                              |      | 25.0                                                                              |                                                                                   |      | 51.0  | 51.0                                                                                |      | 19.0 |
| Total Split (%)         | 13.6% | 13.6%                                                                             | 22.7%                                                                             | 13.6% | 13.6%                                                                             |      | 22.7%                                                                             |                                                                                   |      | 46.4% | 46.4%                                                                               |      | 17%  |
| Yellow Time (s)         | 4.0   | 4.0                                                                               | 4.0                                                                               | 4.0   | 4.0                                                                               |      | 4.0                                                                               |                                                                                   |      | 4.0   | 4.0                                                                                 |      | 4.0  |
| All-Red Time (s)        | 1.0   | 1.0                                                                               | 1.0                                                                               | 1.0   | 1.0                                                                               |      | 1.0                                                                               |                                                                                   |      | 1.0   | 1.0                                                                                 |      | 0.0  |
| Lost Time Adjust (s)    |       | 0.0                                                                               | 0.0                                                                               |       | 0.0                                                                               |      | 0.0                                                                               |                                                                                   |      |       | 0.0                                                                                 |      |      |
| Total Lost Time (s)     |       | 5.0                                                                               | 5.0                                                                               |       | 5.0                                                                               |      | 5.0                                                                               |                                                                                   |      |       | 5.0                                                                                 |      |      |
| Lead/Lag                | Lag   | Lag                                                                               | Lead                                                                              | Lag   | Lag                                                                               |      | Lead                                                                              |                                                                                   |      | Lag   | Lag                                                                                 |      | Lead |
| Lead-Lag Optimize?      |       |                                                                                   |                                                                                   |       |                                                                                   |      |                                                                                   |                                                                                   |      |       |                                                                                     |      |      |
| Recall Mode             | Min   | Min                                                                               | Max                                                                               | Min   | Min                                                                               |      | Max                                                                               |                                                                                   |      | Max   | Max                                                                                 |      | None |
| Act Effct Green (s)     |       | 9.6                                                                               | 29.8                                                                              |       | 9.6                                                                               |      | 66.6                                                                              | 71.7                                                                              |      |       | 46.4                                                                                |      |      |
| Actuated g/C Ratio      |       | 0.09                                                                              | 0.29                                                                              |       | 0.09                                                                              |      | 0.65                                                                              | 0.70                                                                              |      |       | 0.45                                                                                |      |      |
| v/c Ratio               |       | 0.20                                                                              | 0.93                                                                              |       | 0.54                                                                              |      | 0.81                                                                              | 0.58                                                                              |      |       | 0.95                                                                                |      |      |
| Control Delay           |       | 50.4                                                                              | 63.6                                                                              |       | 61.1                                                                              |      | 28.9                                                                              | 11.7                                                                              |      |       | 51.1                                                                                |      |      |
| Queue Delay             |       | 0.0                                                                               | 0.0                                                                               |       | 0.0                                                                               |      | 0.0                                                                               | 1.7                                                                               |      |       | 0.0                                                                                 |      |      |
| Total Delay             |       | 50.4                                                                              | 63.6                                                                              |       | 61.1                                                                              |      | 28.9                                                                              | 13.4                                                                              |      |       | 51.1                                                                                |      |      |
| LOS                     |       | D                                                                                 | E                                                                                 |       | E                                                                                 |      | C                                                                                 | B                                                                                 |      |       | D                                                                                   |      |      |
| Approach Delay          |       | 62.9                                                                              |                                                                                   |       | 61.1                                                                              |      |                                                                                   | 19.0                                                                              |      |       | 51.1                                                                                |      |      |
| Approach LOS            |       | E                                                                                 |                                                                                   |       | E                                                                                 |      |                                                                                   | B                                                                                 |      |       | D                                                                                   |      |      |
| Queue Length 50th (ft)  |       | 15                                                                                | 285                                                                               |       | 56                                                                                |      | 163                                                                               | 297                                                                               |      |       | ~628                                                                                |      |      |
| Queue Length 95th (ft)  |       | 42                                                                                | #515                                                                              |       | #114                                                                              |      | #344                                                                              | 418                                                                               |      |       | #870                                                                                |      |      |
| Internal Link Dist (ft) |       | 544                                                                               |                                                                                   |       | 307                                                                               |      |                                                                                   | 428                                                                               |      |       | 451                                                                                 |      |      |
| Turn Bay Length (ft)    |       |                                                                                   | 50                                                                                |       |                                                                                   |      | 75                                                                                |                                                                                   |      |       |                                                                                     |      |      |
| Base Capacity (vph)     |       | 121                                                                               | 468                                                                               |       | 156                                                                               |      | 531                                                                               | 1309                                                                              |      |       | 861                                                                                 |      |      |
| Starvation Cap Reductn  |       | 0                                                                                 | 0                                                                                 |       | 0                                                                                 |      | 0                                                                                 | 357                                                                               |      |       | 0                                                                                   |      |      |
| Spillback Cap Reductn   |       | 0                                                                                 | 0                                                                                 |       | 0                                                                                 |      | 0                                                                                 | 0                                                                                 |      |       | 0                                                                                   |      |      |
| Storage Cap Reductn     |       | 0                                                                                 | 0                                                                                 |       | 0                                                                                 |      | 0                                                                                 | 0                                                                                 |      |       | 0                                                                                   |      |      |
| Reduced v/c Ratio       |       | 0.19                                                                              | 0.93                                                                              |       | 0.52                                                                              |      | 0.81                                                                              | 0.80                                                                              |      |       | 0.95                                                                                |      |      |

#### Intersection Summary

Area Type: Other

Cycle Length: 110

Actuated Cycle Length: 102

Natural Cycle: 100

Control Type: Semi Act-Uncoord

Maximum v/c Ratio: 0.95

Intersection Signal Delay: 38.5

Intersection LOS: D

Intersection Capacity Utilization 100.2%

ICU Level of Service G

Analysis Period (min) 15

~ Volume exceeds capacity, queue is theoretically infinite.

Queue shown is maximum after two cycles.

# 95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

Splits and Phases: 17: Centre Street & Walnut Street



|                         |  |  |  |  |  |  |  |  |  |  |  |  |  |
|-------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
| Lane Group              | EBL                                                                               | EBT                                                                               | EBR                                                                               | WBL                                                                               | WBT                                                                               | WBR                                                                               | NBL                                                                               | NBT                                                                               | NBR                                                                               | SBL                                                                                 | SBT                                                                                 | SBR                                                                                 | Ø3                                                                                  |
| Lane Configurations     |                                                                                   |  |                                                                                   |                                                                                   |  |                                                                                   |                                                                                   |  |                                                                                   |                                                                                     |  |                                                                                     |                                                                                     |
| Traffic Volume (vph)    | 165                                                                               | 245                                                                               | 55                                                                                | 10                                                                                | 195                                                                               | 45                                                                                | 90                                                                                | 280                                                                               | 5                                                                                 | 60                                                                                  | 340                                                                                 | 315                                                                                 |                                                                                     |
| Future Volume (vph)     | 165                                                                               | 245                                                                               | 55                                                                                | 10                                                                                | 195                                                                               | 45                                                                                | 90                                                                                | 280                                                                               | 5                                                                                 | 60                                                                                  | 340                                                                                 | 315                                                                                 |                                                                                     |
| Ideal Flow (vphpl)      | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                                | 1900                                                                                | 1900                                                                                |                                                                                     |
| Satd. Flow (prot)       | 0                                                                                 | 1833                                                                              | 0                                                                                 | 0                                                                                 | 1843                                                                              | 0                                                                                 | 0                                                                                 | 1873                                                                              | 0                                                                                 | 0                                                                                   | 1762                                                                                | 0                                                                                   |                                                                                     |
| Fit Permitted           |                                                                                   | 0.691                                                                             |                                                                                   |                                                                                   | 0.976                                                                             |                                                                                   |                                                                                   | 0.615                                                                             |                                                                                   |                                                                                     | 0.933                                                                               |                                                                                     |                                                                                     |
| Satd. Flow (perm)       | 0                                                                                 | 1288                                                                              | 0                                                                                 | 0                                                                                 | 1802                                                                              | 0                                                                                 | 0                                                                                 | 1166                                                                              | 0                                                                                 | 0                                                                                   | 1650                                                                                | 0                                                                                   |                                                                                     |
| Right Turn on Red       |                                                                                   |                                                                                   | Yes                                                                               |                                                                                   |                                                                                   | Yes                                                                               |                                                                                   |                                                                                   | Yes                                                                               |                                                                                     |                                                                                     | Yes                                                                                 |                                                                                     |
| Satd. Flow (RTOR)       |                                                                                   | 6                                                                                 |                                                                                   |                                                                                   | 10                                                                                |                                                                                   |                                                                                   | 1                                                                                 |                                                                                   |                                                                                     | 41                                                                                  |                                                                                     |                                                                                     |
| Link Speed (mph)        |                                                                                   | 30                                                                                |                                                                                   |                                                                                   | 30                                                                                |                                                                                   |                                                                                   | 30                                                                                |                                                                                   |                                                                                     | 30                                                                                  |                                                                                     |                                                                                     |
| Link Distance (ft)      |                                                                                   | 764                                                                               |                                                                                   |                                                                                   | 972                                                                               |                                                                                   |                                                                                   | 2055                                                                              |                                                                                   |                                                                                     | 1553                                                                                |                                                                                     |                                                                                     |
| Travel Time (s)         |                                                                                   | 17.4                                                                              |                                                                                   |                                                                                   | 22.1                                                                              |                                                                                   |                                                                                   | 46.7                                                                              |                                                                                   |                                                                                     | 35.3                                                                                |                                                                                     |                                                                                     |
| Confl. Peds. (#/hr)     | 2                                                                                 |                                                                                   | 2                                                                                 | 2                                                                                 |                                                                                   | 2                                                                                 | 3                                                                                 |                                                                                   | 5                                                                                 | 5                                                                                   |                                                                                     | 3                                                                                   |                                                                                     |
| Peak Hour Factor        | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                                | 0.92                                                                                | 0.92                                                                                |                                                                                     |
| Heavy Vehicles (%)      | 0%                                                                                | 0%                                                                                | 0%                                                                                | 0%                                                                                | 0%                                                                                | 0%                                                                                | 0%                                                                                | 0%                                                                                | 0%                                                                                | 0%                                                                                  | 0%                                                                                  | 0%                                                                                  |                                                                                     |
| Shared Lane Traffic (%) |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Lane Group Flow (vph)   | 0                                                                                 | 505                                                                               | 0                                                                                 | 0                                                                                 | 272                                                                               | 0                                                                                 | 0                                                                                 | 407                                                                               | 0                                                                                 | 0                                                                                   | 777                                                                                 | 0                                                                                   |                                                                                     |
| Turn Type               | Perm                                                                              | NA                                                                                |                                                                                   | Perm                                                                              | NA                                                                                |                                                                                   | Perm                                                                              | NA                                                                                |                                                                                   | Perm                                                                                | NA                                                                                  |                                                                                     |                                                                                     |
| Protected Phases        |                                                                                   | 1                                                                                 |                                                                                   |                                                                                   | 1                                                                                 |                                                                                   |                                                                                   | 2                                                                                 |                                                                                   |                                                                                     | 2                                                                                   |                                                                                     | 3                                                                                   |
| Permitted Phases        | 1                                                                                 |                                                                                   |                                                                                   | 1                                                                                 |                                                                                   |                                                                                   | 2                                                                                 |                                                                                   |                                                                                   | 2                                                                                   |                                                                                     |                                                                                     |                                                                                     |
| Detector Phase          | 1                                                                                 | 1                                                                                 |                                                                                   | 1                                                                                 | 1                                                                                 |                                                                                   | 2                                                                                 | 2                                                                                 |                                                                                   | 2                                                                                   | 2                                                                                   |                                                                                     |                                                                                     |
| Switch Phase            |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Minimum Initial (s)     | 6.0                                                                               | 6.0                                                                               |                                                                                   | 6.0                                                                               | 6.0                                                                               |                                                                                   | 6.0                                                                               | 6.0                                                                               |                                                                                   | 6.0                                                                                 | 6.0                                                                                 |                                                                                     | 4.0                                                                                 |
| Minimum Split (s)       | 11.0                                                                              | 11.0                                                                              |                                                                                   | 11.0                                                                              | 11.0                                                                              |                                                                                   | 11.0                                                                              | 11.0                                                                              |                                                                                   | 11.0                                                                                | 11.0                                                                                |                                                                                     | 19.0                                                                                |
| Total Split (s)         | 45.0                                                                              | 45.0                                                                              |                                                                                   | 45.0                                                                              | 45.0                                                                              |                                                                                   | 56.0                                                                              | 56.0                                                                              |                                                                                   | 56.0                                                                                | 56.0                                                                                |                                                                                     | 19.0                                                                                |
| Total Split (%)         | 37.5%                                                                             | 37.5%                                                                             |                                                                                   | 37.5%                                                                             | 37.5%                                                                             |                                                                                   | 46.7%                                                                             | 46.7%                                                                             |                                                                                   | 46.7%                                                                               | 46.7%                                                                               |                                                                                     | 16%                                                                                 |
| Yellow Time (s)         | 3.0                                                                               | 3.0                                                                               |                                                                                   | 3.0                                                                               | 3.0                                                                               |                                                                                   | 3.0                                                                               | 3.0                                                                               |                                                                                   | 3.0                                                                                 | 3.0                                                                                 |                                                                                     | 3.0                                                                                 |
| All-Red Time (s)        | 2.0                                                                               | 2.0                                                                               |                                                                                   | 2.0                                                                               | 2.0                                                                               |                                                                                   | 2.0                                                                               | 2.0                                                                               |                                                                                   | 2.0                                                                                 | 2.0                                                                                 |                                                                                     | 1.0                                                                                 |
| Lost Time Adjust (s)    |                                                                                   | 0.0                                                                               |                                                                                   |                                                                                   | 0.0                                                                               |                                                                                   |                                                                                   | 0.0                                                                               |                                                                                   |                                                                                     | 0.0                                                                                 |                                                                                     |                                                                                     |
| Total Lost Time (s)     |                                                                                   | 5.0                                                                               |                                                                                   |                                                                                   | 5.0                                                                               |                                                                                   |                                                                                   | 5.0                                                                               |                                                                                   |                                                                                     | 5.0                                                                                 |                                                                                     |                                                                                     |
| Lead/Lag                | Lead                                                                              | Lead                                                                              |                                                                                   | Lead                                                                              | Lead                                                                              |                                                                                   | Lag                                                                               | Lag                                                                               |                                                                                   | Lag                                                                                 | Lag                                                                                 |                                                                                     |                                                                                     |
| Lead-Lag Optimize?      |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Recall Mode             | None                                                                              | None                                                                              |                                                                                   | None                                                                              | None                                                                              |                                                                                   | None                                                                              | None                                                                              |                                                                                   | None                                                                                | None                                                                                |                                                                                     | None                                                                                |
| Act Effect Green (s)    |                                                                                   | 40.2                                                                              |                                                                                   |                                                                                   | 40.2                                                                              |                                                                                   |                                                                                   | 51.2                                                                              |                                                                                   |                                                                                     | 51.2                                                                                |                                                                                     |                                                                                     |
| Actuated g/C Ratio      |                                                                                   | 0.38                                                                              |                                                                                   |                                                                                   | 0.38                                                                              |                                                                                   |                                                                                   | 0.49                                                                              |                                                                                   |                                                                                     | 0.49                                                                                |                                                                                     |                                                                                     |
| v/c Ratio               |                                                                                   | 1.02                                                                              |                                                                                   |                                                                                   | 0.39                                                                              |                                                                                   |                                                                                   | 0.71                                                                              |                                                                                   |                                                                                     | 0.94                                                                                |                                                                                     |                                                                                     |
| Control Delay           |                                                                                   | 77.8                                                                              |                                                                                   |                                                                                   | 25.7                                                                              |                                                                                   |                                                                                   | 31.0                                                                              |                                                                                   |                                                                                     | 45.3                                                                                |                                                                                     |                                                                                     |
| Queue Delay             |                                                                                   | 0.0                                                                               |                                                                                   |                                                                                   | 0.0                                                                               |                                                                                   |                                                                                   | 0.0                                                                               |                                                                                   |                                                                                     | 0.0                                                                                 |                                                                                     |                                                                                     |
| Total Delay             |                                                                                   | 77.8                                                                              |                                                                                   |                                                                                   | 25.7                                                                              |                                                                                   |                                                                                   | 31.0                                                                              |                                                                                   |                                                                                     | 45.3                                                                                |                                                                                     |                                                                                     |
| LOS                     |                                                                                   | E                                                                                 |                                                                                   |                                                                                   | C                                                                                 |                                                                                   |                                                                                   | C                                                                                 |                                                                                   |                                                                                     | D                                                                                   |                                                                                     |                                                                                     |
| Approach Delay          |                                                                                   | 77.8                                                                              |                                                                                   |                                                                                   | 25.7                                                                              |                                                                                   |                                                                                   | 31.0                                                                              |                                                                                   |                                                                                     | 45.3                                                                                |                                                                                     |                                                                                     |
| Approach LOS            |                                                                                   | E                                                                                 |                                                                                   |                                                                                   | C                                                                                 |                                                                                   |                                                                                   | C                                                                                 |                                                                                   |                                                                                     | D                                                                                   |                                                                                     |                                                                                     |
| Queue Length 50th (ft)  |                                                                                   | 313                                                                               |                                                                                   |                                                                                   | 117                                                                               |                                                                                   |                                                                                   | 191                                                                               |                                                                                   |                                                                                     | 422                                                                                 |                                                                                     |                                                                                     |
| Queue Length 95th (ft)  |                                                                                   | #678                                                                              |                                                                                   |                                                                                   | 240                                                                               |                                                                                   |                                                                                   | #455                                                                              |                                                                                   |                                                                                     | #893                                                                                |                                                                                     |                                                                                     |
| Internal Link Dist (ft) |                                                                                   | 684                                                                               |                                                                                   |                                                                                   | 892                                                                               |                                                                                   |                                                                                   | 1975                                                                              |                                                                                   |                                                                                     | 1473                                                                                |                                                                                     |                                                                                     |
| Turn Bay Length (ft)    |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Base Capacity (vph)     |                                                                                   | 497                                                                               |                                                                                   |                                                                                   | 697                                                                               |                                                                                   |                                                                                   | 570                                                                               |                                                                                   |                                                                                     | 827                                                                                 |                                                                                     |                                                                                     |
| Starvation Cap Reductn  |                                                                                   | 0                                                                                 |                                                                                   |                                                                                   | 0                                                                                 |                                                                                   |                                                                                   | 0                                                                                 |                                                                                   |                                                                                     | 0                                                                                   |                                                                                     |                                                                                     |
| Spillback Cap Reductn   |                                                                                   | 0                                                                                 |                                                                                   |                                                                                   | 0                                                                                 |                                                                                   |                                                                                   | 0                                                                                 |                                                                                   |                                                                                     | 0                                                                                   |                                                                                     |                                                                                     |
| Storage Cap Reductn     |                                                                                   | 0                                                                                 |                                                                                   |                                                                                   | 0                                                                                 |                                                                                   |                                                                                   | 0                                                                                 |                                                                                   |                                                                                     | 0                                                                                   |                                                                                     |                                                                                     |
| Reduced v/c Ratio       |                                                                                   | 1.02                                                                              |                                                                                   |                                                                                   | 0.39                                                                              |                                                                                   |                                                                                   | 0.71                                                                              |                                                                                   |                                                                                     | 0.94                                                                                |                                                                                     |                                                                                     |

#### Intersection Summary

Area Type: Other

Cycle Length: 120

Actuated Cycle Length: 104.8

Natural Cycle: 150

Control Type: Actuated-Uncoordinated

Maximum v/c Ratio: 1.02

Intersection Signal Delay: 48.0

Intersection LOS: D

Intersection Capacity Utilization 95.6%

ICU Level of Service F

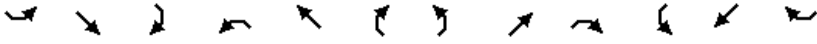
Analysis Period (min) 15

# 95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

Splits and Phases: 3: Chestnut Street & Elliot Street

|                                                                                     |                                                                                     |                                                                                       |
|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|
|  |  |  |
| Ø1                                                                                  | Ø2                                                                                  | Ø3                                                                                    |
| 45 s                                                                                | 56 s                                                                                | 19 s                                                                                  |

|                         |  |                                                                                   |                                                                                   |       |                                                                                   |      |                                                                                   |                                                                                   |      |       |                                                                                     |      |      |
|-------------------------|------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-------|-----------------------------------------------------------------------------------|------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|------|-------|-------------------------------------------------------------------------------------|------|------|
| Lane Group              | SEL                                                                                | SET                                                                               | SER                                                                               | NWL   | NWT                                                                               | NWR  | NEL                                                                               | NET                                                                               | NER  | SWL   | SWT                                                                                 | SWR  | Ø3   |
| Lane Configurations     |                                                                                    |  |  |       |  |      |  |  |      |       |  |      |      |
| Traffic Volume (vph)    | 30                                                                                 | 2                                                                                 | 445                                                                               | 15    | 50                                                                                | 0    | 430                                                                               | 610                                                                               | 10   | 2     | 645                                                                                 | 60   |      |
| Future Volume (vph)     | 30                                                                                 | 2                                                                                 | 445                                                                               | 15    | 50                                                                                | 0    | 430                                                                               | 610                                                                               | 10   | 2     | 645                                                                                 | 60   |      |
| Ideal Flow (vphpl)      | 1900                                                                               | 1900                                                                              | 1900                                                                              | 1900  | 1900                                                                              | 1900 | 1900                                                                              | 1900                                                                              | 1900 | 1900  | 1900                                                                                | 1900 |      |
| Storage Length (ft)     | 0                                                                                  |                                                                                   | 50                                                                                | 0     |                                                                                   | 0    | 75                                                                                |                                                                                   | 0    | 0     |                                                                                     | 0    |      |
| Storage Lanes           | 0                                                                                  |                                                                                   | 1                                                                                 | 0     |                                                                                   | 0    | 1                                                                                 |                                                                                   | 0    | 0     |                                                                                     | 0    |      |
| Taper Length (ft)       | 25                                                                                 |                                                                                   |                                                                                   | 25    |                                                                                   |      | 25                                                                                |                                                                                   |      | 25    |                                                                                     |      |      |
| Satd. Flow (prot)       | 0                                                                                  | 1814                                                                              | 1615                                                                              | 0     | 1879                                                                              | 0    | 1787                                                                              | 1877                                                                              | 0    | 0     | 1857                                                                                | 0    |      |
| Flt Permitted           |                                                                                    | 0.720                                                                             |                                                                                   |       | 0.917                                                                             |      | 0.219                                                                             |                                                                                   |      |       | 0.999                                                                               |      |      |
| Satd. Flow (perm)       | 0                                                                                  | 1308                                                                              | 1555                                                                              | 0     | 1721                                                                              | 0    | 412                                                                               | 1877                                                                              | 0    | 0     | 1855                                                                                | 0    |      |
| Right Turn on Red       |                                                                                    |                                                                                   | No                                                                                |       |                                                                                   | No   |                                                                                   |                                                                                   | Yes  |       |                                                                                     | Yes  |      |
| Satd. Flow (RTOR)       |                                                                                    |                                                                                   |                                                                                   |       |                                                                                   |      |                                                                                   | 2                                                                                 |      |       | 5                                                                                   |      |      |
| Link Speed (mph)        |                                                                                    | 30                                                                                |                                                                                   |       | 30                                                                                |      |                                                                                   | 30                                                                                |      |       | 30                                                                                  |      |      |
| Link Distance (ft)      |                                                                                    | 624                                                                               |                                                                                   |       | 387                                                                               |      |                                                                                   | 508                                                                               |      |       | 531                                                                                 |      |      |
| Travel Time (s)         |                                                                                    | 14.2                                                                              |                                                                                   |       | 8.8                                                                               |      |                                                                                   | 11.5                                                                              |      |       | 12.1                                                                                |      |      |
| Confl. Peds. (#/hr)     | 11                                                                                 |                                                                                   | 10                                                                                | 10    |                                                                                   | 11   | 4                                                                                 |                                                                                   | 8    | 8     |                                                                                     | 4    |      |
| Peak Hour Factor        | 0.92                                                                               | 0.92                                                                              | 0.92                                                                              | 0.92  | 0.92                                                                              | 0.92 | 0.92                                                                              | 0.92                                                                              | 0.92 | 0.92  | 0.92                                                                                | 0.92 |      |
| Heavy Vehicles (%)      | 0%                                                                                 | 0%                                                                                | 0%                                                                                | 0%    | 0%                                                                                | 0%   | 1%                                                                                | 1%                                                                                | 1%   | 1%    | 1%                                                                                  | 1%   |      |
| Shared Lane Traffic (%) |                                                                                    |                                                                                   |                                                                                   |       |                                                                                   |      |                                                                                   |                                                                                   |      |       |                                                                                     |      |      |
| Lane Group Flow (vph)   | 0                                                                                  | 35                                                                                | 484                                                                               | 0     | 70                                                                                | 0    | 467                                                                               | 674                                                                               | 0    | 0     | 768                                                                                 | 0    |      |
| Turn Type               | Perm                                                                               | NA                                                                                | pm+ov                                                                             | Perm  | NA                                                                                |      | D,P+P                                                                             | NA                                                                                |      | Perm  | NA                                                                                  |      |      |
| Protected Phases        |                                                                                    | 4                                                                                 | 1                                                                                 |       | 4                                                                                 |      | 1                                                                                 | 1 2                                                                               |      |       | 2                                                                                   |      | 3    |
| Permitted Phases        | 4                                                                                  |                                                                                   | 4                                                                                 | 4     |                                                                                   |      | 2                                                                                 |                                                                                   |      | 2     |                                                                                     |      |      |
| Detector Phase          | 4                                                                                  | 4                                                                                 | 1                                                                                 | 4     | 4                                                                                 |      | 1                                                                                 | 1 2                                                                               |      | 2     | 2                                                                                   |      |      |
| Switch Phase            |                                                                                    |                                                                                   |                                                                                   |       |                                                                                   |      |                                                                                   |                                                                                   |      |       |                                                                                     |      |      |
| Minimum Initial (s)     | 9.0                                                                                | 9.0                                                                               | 7.0                                                                               | 9.0   | 9.0                                                                               |      | 7.0                                                                               |                                                                                   |      | 6.0   | 6.0                                                                                 |      | 4.0  |
| Minimum Split (s)       | 14.0                                                                               | 14.0                                                                              | 12.0                                                                              | 14.0  | 14.0                                                                              |      | 12.0                                                                              |                                                                                   |      | 11.0  | 11.0                                                                                |      | 19.0 |
| Total Split (s)         | 15.0                                                                               | 15.0                                                                              | 27.0                                                                              | 15.0  | 15.0                                                                              |      | 27.0                                                                              |                                                                                   |      | 49.0  | 49.0                                                                                |      | 19.0 |
| Total Split (%)         | 13.6%                                                                              | 13.6%                                                                             | 24.5%                                                                             | 13.6% | 13.6%                                                                             |      | 24.5%                                                                             |                                                                                   |      | 44.5% | 44.5%                                                                               |      | 17%  |
| Yellow Time (s)         | 4.0                                                                                | 4.0                                                                               | 4.0                                                                               | 4.0   | 4.0                                                                               |      | 4.0                                                                               |                                                                                   |      | 4.0   | 4.0                                                                                 |      | 4.0  |
| All-Red Time (s)        | 1.0                                                                                | 1.0                                                                               | 1.0                                                                               | 1.0   | 1.0                                                                               |      | 1.0                                                                               |                                                                                   |      | 1.0   | 1.0                                                                                 |      | 0.0  |
| Lost Time Adjust (s)    |                                                                                    | 0.0                                                                               | 0.0                                                                               |       | 0.0                                                                               |      | 0.0                                                                               |                                                                                   |      |       | 0.0                                                                                 |      |      |
| Total Lost Time (s)     |                                                                                    | 5.0                                                                               | 5.0                                                                               |       | 5.0                                                                               |      | 5.0                                                                               |                                                                                   |      |       | 5.0                                                                                 |      |      |
| Lead/Lag                | Lag                                                                                | Lag                                                                               | Lead                                                                              | Lag   | Lag                                                                               |      | Lead                                                                              |                                                                                   |      | Lag   | Lag                                                                                 |      | Lead |
| Lead-Lag Optimize?      |                                                                                    |                                                                                   |                                                                                   |       |                                                                                   |      |                                                                                   |                                                                                   |      |       |                                                                                     |      |      |
| Recall Mode             | Min                                                                                | Min                                                                               | Max                                                                               | Min   | Min                                                                               |      | Max                                                                               |                                                                                   |      | Max   | Max                                                                                 |      | None |
| Act Effct Green (s)     |                                                                                    | 9.5                                                                               | 31.7                                                                              |       | 9.5                                                                               |      | 66.6                                                                              | 71.7                                                                              |      |       | 44.4                                                                                |      |      |
| Actuated g/C Ratio      |                                                                                    | 0.09                                                                              | 0.31                                                                              |       | 0.09                                                                              |      | 0.65                                                                              | 0.70                                                                              |      |       | 0.44                                                                                |      |      |
| v/c Ratio               |                                                                                    | 0.29                                                                              | 0.98                                                                              |       | 0.44                                                                              |      | 0.82                                                                              | 0.51                                                                              |      |       | 0.95                                                                                |      |      |
| Control Delay           |                                                                                    | 52.8                                                                              | 70.7                                                                              |       | 55.6                                                                              |      | 29.8                                                                              | 10.2                                                                              |      |       | 51.2                                                                                |      |      |
| Queue Delay             |                                                                                    | 0.0                                                                               | 0.0                                                                               |       | 0.0                                                                               |      | 0.0                                                                               | 1.1                                                                               |      |       | 0.0                                                                                 |      |      |
| Total Delay             |                                                                                    | 52.8                                                                              | 70.7                                                                              |       | 55.6                                                                              |      | 29.8                                                                              | 11.4                                                                              |      |       | 51.2                                                                                |      |      |
| LOS                     |                                                                                    | D                                                                                 | E                                                                                 |       | E                                                                                 |      | C                                                                                 | B                                                                                 |      |       | D                                                                                   |      |      |
| Approach Delay          |                                                                                    | 69.5                                                                              |                                                                                   |       | 55.6                                                                              |      |                                                                                   | 18.9                                                                              |      |       | 51.2                                                                                |      |      |
| Approach LOS            |                                                                                    | E                                                                                 |                                                                                   |       | E                                                                                 |      |                                                                                   | B                                                                                 |      |       | D                                                                                   |      |      |
| Queue Length 50th (ft)  |                                                                                    | 24                                                                                | ~351                                                                              |       | 48                                                                                |      | 185                                                                               | 233                                                                               |      |       | ~570                                                                                |      |      |
| Queue Length 95th (ft)  |                                                                                    | 57                                                                                | #574                                                                              |       | 95                                                                                |      | #380                                                                              | 337                                                                               |      |       | #818                                                                                |      |      |
| Internal Link Dist (ft) |                                                                                    | 544                                                                               |                                                                                   |       | 307                                                                               |      |                                                                                   | 428                                                                               |      |       | 451                                                                                 |      |      |
| Turn Bay Length (ft)    |                                                                                    |                                                                                   | 50                                                                                |       |                                                                                   |      | 75                                                                                |                                                                                   |      |       |                                                                                     |      |      |
| Base Capacity (vph)     |                                                                                    | 129                                                                               | 496                                                                               |       | 170                                                                               |      | 569                                                                               | 1322                                                                              |      |       | 812                                                                                 |      |      |
| Starvation Cap Reductn  |                                                                                    | 0                                                                                 | 0                                                                                 |       | 0                                                                                 |      | 0                                                                                 | 399                                                                               |      |       | 0                                                                                   |      |      |
| Spillback Cap Reductn   |                                                                                    | 0                                                                                 | 0                                                                                 |       | 0                                                                                 |      | 0                                                                                 | 0                                                                                 |      |       | 0                                                                                   |      |      |
| Storage Cap Reductn     |                                                                                    | 0                                                                                 | 0                                                                                 |       | 0                                                                                 |      | 0                                                                                 | 0                                                                                 |      |       | 0                                                                                   |      |      |
| Reduced v/c Ratio       |                                                                                    | 0.27                                                                              | 0.98                                                                              |       | 0.41                                                                              |      | 0.82                                                                              | 0.73                                                                              |      |       | 0.95                                                                                |      |      |

#### Intersection Summary

Area Type: Other

Cycle Length: 110

Actuated Cycle Length: 101.8

Natural Cycle: 110

Control Type: Semi Act-Uncoord

Maximum v/c Ratio: 0.98

Intersection Signal Delay: 40.4

Intersection LOS: D

Intersection Capacity Utilization 93.1%

ICU Level of Service F

Analysis Period (min) 15

~ Volume exceeds capacity, queue is theoretically infinite.

Queue shown is maximum after two cycles.

# 95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

Splits and Phases: 17: Centre Street & Walnut Street





| Lane Group              | EBL   | EBT                                                                               | EBR  | WBL   | WBT                                                                               | WBR  | NBL   | NBT                                                                               | NBR  | SBL   | SBT                                                                                 | SBR  | Ø3   |
|-------------------------|-------|-----------------------------------------------------------------------------------|------|-------|-----------------------------------------------------------------------------------|------|-------|-----------------------------------------------------------------------------------|------|-------|-------------------------------------------------------------------------------------|------|------|
| Lane Configurations     |       |  |      |       |  |      |       |  |      |       |  |      |      |
| Traffic Volume (vph)    | 185   | 155                                                                               | 45   | 5     | 125                                                                               | 65   | 80    | 250                                                                               | 10   | 55    | 330                                                                                 | 195  |      |
| Future Volume (vph)     | 185   | 155                                                                               | 45   | 5     | 125                                                                               | 65   | 80    | 250                                                                               | 10   | 55    | 330                                                                                 | 195  |      |
| Ideal Flow (vphpl)      | 1900  | 1900                                                                              | 1900 | 1900  | 1900                                                                              | 1900 | 1900  | 1900                                                                              | 1900 | 1900  | 1900                                                                                | 1900 |      |
| Satd. Flow (prot)       | 0     | 1821                                                                              | 0    | 0     | 1773                                                                              | 0    | 0     | 1868                                                                              | 0    | 0     | 1789                                                                                | 0    |      |
| Fit Permitted           |       | 0.714                                                                             |      |       | 0.990                                                                             |      |       | 0.684                                                                             |      |       | 0.935                                                                               |      |      |
| Satd. Flow (perm)       | 0     | 1326                                                                              | 0    | 0     | 1757                                                                              | 0    | 0     | 1293                                                                              | 0    | 0     | 1681                                                                                | 0    |      |
| Right Turn on Red       |       |                                                                                   | Yes  |       |                                                                                   | Yes  |       |                                                                                   | Yes  |       |                                                                                     | Yes  |      |
| Satd. Flow (RTOR)       |       | 7                                                                                 |      |       | 25                                                                                |      |       | 2                                                                                 |      |       | 33                                                                                  |      |      |
| Link Speed (mph)        |       | 30                                                                                |      |       | 30                                                                                |      |       | 30                                                                                |      |       | 30                                                                                  |      |      |
| Link Distance (ft)      |       | 764                                                                               |      |       | 972                                                                               |      |       | 2055                                                                              |      |       | 1553                                                                                |      |      |
| Travel Time (s)         |       | 17.4                                                                              |      |       | 22.1                                                                              |      |       | 46.7                                                                              |      |       | 35.3                                                                                |      |      |
| Confl. Peds. (#/hr)     | 6     |                                                                                   | 4    | 4     |                                                                                   | 6    | 6     |                                                                                   | 2    | 2     |                                                                                     | 6    |      |
| Confl. Bikes (#/hr)     |       |                                                                                   |      |       |                                                                                   | 4    |       |                                                                                   | 2    |       |                                                                                     | 1    |      |
| Peak Hour Factor        | 0.92  | 0.92                                                                              | 0.92 | 0.92  | 0.92                                                                              | 0.92 | 0.92  | 0.92                                                                              | 0.92 | 0.92  | 0.92                                                                                | 0.92 |      |
| Heavy Vehicles (%)      | 0%    | 0%                                                                                | 0%   | 1%    | 1%                                                                                | 1%   | 0%    | 0%                                                                                | 0%   | 0%    | 0%                                                                                  | 0%   |      |
| Shared Lane Traffic (%) |       |                                                                                   |      |       |                                                                                   |      |       |                                                                                   |      |       |                                                                                     |      |      |
| Lane Group Flow (vph)   | 0     | 418                                                                               | 0    | 0     | 212                                                                               | 0    | 0     | 370                                                                               | 0    | 0     | 631                                                                                 | 0    |      |
| Turn Type               | Perm  | NA                                                                                |      | Perm  | NA                                                                                |      | Perm  | NA                                                                                |      | Perm  | NA                                                                                  |      |      |
| Protected Phases        |       | 1                                                                                 |      |       | 1                                                                                 |      |       | 2                                                                                 |      |       | 2                                                                                   |      | 3    |
| Permitted Phases        | 1     |                                                                                   |      | 1     |                                                                                   |      | 2     |                                                                                   |      | 2     |                                                                                     |      |      |
| Detector Phase          | 1     | 1                                                                                 |      | 1     | 1                                                                                 |      | 2     | 2                                                                                 |      | 2     | 2                                                                                   |      |      |
| Switch Phase            |       |                                                                                   |      |       |                                                                                   |      |       |                                                                                   |      |       |                                                                                     |      |      |
| Minimum Initial (s)     | 6.0   | 6.0                                                                               |      | 6.0   | 6.0                                                                               |      | 6.0   | 6.0                                                                               |      | 6.0   | 6.0                                                                                 |      | 4.0  |
| Minimum Split (s)       | 11.0  | 11.0                                                                              |      | 11.0  | 11.0                                                                              |      | 11.0  | 11.0                                                                              |      | 11.0  | 11.0                                                                                |      | 19.0 |
| Total Split (s)         | 32.0  | 32.0                                                                              |      | 32.0  | 32.0                                                                              |      | 49.0  | 49.0                                                                              |      | 49.0  | 49.0                                                                                |      | 19.0 |
| Total Split (%)         | 32.0% | 32.0%                                                                             |      | 32.0% | 32.0%                                                                             |      | 49.0% | 49.0%                                                                             |      | 49.0% | 49.0%                                                                               |      | 19%  |
| Yellow Time (s)         | 3.0   | 3.0                                                                               |      | 3.0   | 3.0                                                                               |      | 3.0   | 3.0                                                                               |      | 3.0   | 3.0                                                                                 |      | 3.0  |
| All-Red Time (s)        | 2.0   | 2.0                                                                               |      | 2.0   | 2.0                                                                               |      | 2.0   | 2.0                                                                               |      | 2.0   | 2.0                                                                                 |      | 1.0  |
| Lost Time Adjust (s)    |       | 0.0                                                                               |      |       | 0.0                                                                               |      |       | 0.0                                                                               |      |       | 0.0                                                                                 |      |      |
| Total Lost Time (s)     |       | 5.0                                                                               |      |       | 5.0                                                                               |      |       | 5.0                                                                               |      |       | 5.0                                                                                 |      |      |
| Lead/Lag                | Lead  | Lead                                                                              |      | Lead  | Lead                                                                              |      | Lag   | Lag                                                                               |      | Lag   | Lag                                                                                 |      |      |
| Lead-Lag Optimize?      |       |                                                                                   |      |       |                                                                                   |      |       |                                                                                   |      |       |                                                                                     |      |      |
| Recall Mode             | None  | None                                                                              |      | None  | None                                                                              |      | None  | None                                                                              |      | None  | None                                                                                |      | None |
| Act Effect Green (s)    |       | 28.5                                                                              |      |       | 28.5                                                                              |      |       | 32.7                                                                              |      |       | 32.7                                                                                |      |      |
| Actuated g/C Ratio      |       | 0.37                                                                              |      |       | 0.37                                                                              |      |       | 0.42                                                                              |      |       | 0.42                                                                                |      |      |
| v/c Ratio               |       | 0.85                                                                              |      |       | 0.32                                                                              |      |       | 0.68                                                                              |      |       | 0.87                                                                                |      |      |
| Control Delay           |       | 46.3                                                                              |      |       | 22.2                                                                              |      |       | 26.3                                                                              |      |       | 34.4                                                                                |      |      |
| Queue Delay             |       | 0.0                                                                               |      |       | 0.0                                                                               |      |       | 0.0                                                                               |      |       | 0.0                                                                                 |      |      |
| Total Delay             |       | 46.3                                                                              |      |       | 22.2                                                                              |      |       | 26.3                                                                              |      |       | 34.4                                                                                |      |      |
| LOS                     |       | D                                                                                 |      |       | C                                                                                 |      |       | C                                                                                 |      |       | C                                                                                   |      |      |
| Approach Delay          |       | 46.3                                                                              |      |       | 22.2                                                                              |      |       | 26.3                                                                              |      |       | 34.4                                                                                |      |      |
| Approach LOS            |       | D                                                                                 |      |       | C                                                                                 |      |       | C                                                                                 |      |       | C                                                                                   |      |      |
| Queue Length 50th (ft)  |       | 149                                                                               |      |       | 52                                                                                |      |       | 111                                                                               |      |       | 204                                                                                 |      |      |
| Queue Length 95th (ft)  |       | #504                                                                              |      |       | 167                                                                               |      |       | 286                                                                               |      |       | #538                                                                                |      |      |
| Internal Link Dist (ft) |       | 684                                                                               |      |       | 892                                                                               |      |       | 1975                                                                              |      |       | 1473                                                                                |      |      |
| Turn Bay Length (ft)    |       |                                                                                   |      |       |                                                                                   |      |       |                                                                                   |      |       |                                                                                     |      |      |
| Base Capacity (vph)     |       | 491                                                                               |      |       | 660                                                                               |      |       | 774                                                                               |      |       | 1019                                                                                |      |      |
| Starvation Cap Reductn  |       | 0                                                                                 |      |       | 0                                                                                 |      |       | 0                                                                                 |      |       | 0                                                                                   |      |      |
| Spillback Cap Reductn   |       | 0                                                                                 |      |       | 0                                                                                 |      |       | 0                                                                                 |      |       | 0                                                                                   |      |      |
| Storage Cap Reductn     |       | 0                                                                                 |      |       | 0                                                                                 |      |       | 0                                                                                 |      |       | 0                                                                                   |      |      |
| Reduced v/c Ratio       |       | 0.85                                                                              |      |       | 0.32                                                                              |      |       | 0.48                                                                              |      |       | 0.62                                                                                |      |      |

#### Intersection Summary

Area Type: Other

Cycle Length: 100

Actuated Cycle Length: 77.7

Natural Cycle: 90

Control Type: Actuated-Uncoordinated

Maximum v/c Ratio: 0.87

Intersection Signal Delay: 34.1

Intersection LOS: C

Intersection Capacity Utilization 80.6%

ICU Level of Service D

Analysis Period (min) 15

# 95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

Splits and Phases: 3: Chestnut Street & Elliot Street



| Lane Group              | SEL   | SET                                                                               | SER                                                                               | NWL   | NWT                                                                               | NWR  | NEL                                                                               | NET                                                                               | NER  | SWL   | SWT                                                                                 | SWR  | Ø3   |
|-------------------------|-------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-------|-----------------------------------------------------------------------------------|------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|------|-------|-------------------------------------------------------------------------------------|------|------|
| Lane Configurations     |       |  |  |       |  |      |  |  |      |       |  |      |      |
| Traffic Volume (vph)    | 30    | 10                                                                                | 380                                                                               | 40    | 95                                                                                | 5    | 455                                                                               | 380                                                                               | 10   | 5     | 470                                                                                 | 65   |      |
| Future Volume (vph)     | 30    | 10                                                                                | 380                                                                               | 40    | 95                                                                                | 5    | 455                                                                               | 380                                                                               | 10   | 5     | 470                                                                                 | 65   |      |
| Ideal Flow (vphpl)      | 1900  | 1900                                                                              | 1900                                                                              | 1900  | 1900                                                                              | 1900 | 1900                                                                              | 1900                                                                              | 1900 | 1900  | 1900                                                                                | 1900 |      |
| Storage Length (ft)     | 0     |                                                                                   | 50                                                                                | 0     |                                                                                   | 0    | 75                                                                                |                                                                                   | 0    | 0     |                                                                                     | 0    |      |
| Storage Lanes           | 0     |                                                                                   | 1                                                                                 | 0     |                                                                                   | 0    | 1                                                                                 |                                                                                   | 0    | 0     |                                                                                     | 0    |      |
| Taper Length (ft)       | 25    |                                                                                   |                                                                                   | 25    |                                                                                   |      | 25                                                                                |                                                                                   |      | 25    |                                                                                     |      |      |
| Satd. Flow (prot)       | 0     | 1813                                                                              | 1599                                                                              | 0     | 1864                                                                              | 0    | 1805                                                                              | 1891                                                                              | 0    | 0     | 1863                                                                                | 0    |      |
| Flt Permitted           |       | 0.605                                                                             |                                                                                   |       | 0.888                                                                             |      | 0.275                                                                             |                                                                                   |      |       | 0.997                                                                               |      |      |
| Satd. Flow (perm)       | 0     | 1130                                                                              | 1557                                                                              | 0     | 1670                                                                              | 0    | 522                                                                               | 1891                                                                              | 0    | 0     | 1858                                                                                | 0    |      |
| Right Turn on Red       |       |                                                                                   | No                                                                                |       |                                                                                   | No   |                                                                                   |                                                                                   | Yes  |       |                                                                                     | Yes  |      |
| Satd. Flow (RTOR)       |       |                                                                                   |                                                                                   |       |                                                                                   |      |                                                                                   | 2                                                                                 |      |       | 8                                                                                   |      |      |
| Link Speed (mph)        |       | 30                                                                                |                                                                                   |       | 30                                                                                |      |                                                                                   | 30                                                                                |      |       | 30                                                                                  |      |      |
| Link Distance (ft)      |       | 624                                                                               |                                                                                   |       | 387                                                                               |      |                                                                                   | 508                                                                               |      |       | 531                                                                                 |      |      |
| Travel Time (s)         |       | 14.2                                                                              |                                                                                   |       | 8.8                                                                               |      |                                                                                   | 11.5                                                                              |      |       | 12.1                                                                                |      |      |
| Confl. Peds. (#/hr)     | 4     |                                                                                   | 4                                                                                 | 4     |                                                                                   | 4    | 4                                                                                 |                                                                                   | 3    | 3     |                                                                                     | 4    |      |
| Confl. Bikes (#/hr)     |       |                                                                                   |                                                                                   |       |                                                                                   |      |                                                                                   |                                                                                   |      |       |                                                                                     | 2    |      |
| Peak Hour Factor        | 0.92  | 0.92                                                                              | 0.92                                                                              | 0.92  | 0.92                                                                              | 0.92 | 0.92                                                                              | 0.92                                                                              | 0.92 | 0.92  | 0.92                                                                                | 0.92 |      |
| Heavy Vehicles (%)      | 1%    | 1%                                                                                | 1%                                                                                | 0%    | 0%                                                                                | 0%   | 0%                                                                                | 0%                                                                                | 0%   | 0%    | 0%                                                                                  | 0%   |      |
| Shared Lane Traffic (%) |       |                                                                                   |                                                                                   |       |                                                                                   |      |                                                                                   |                                                                                   |      |       |                                                                                     |      |      |
| Lane Group Flow (vph)   | 0     | 44                                                                                | 413                                                                               | 0     | 151                                                                               | 0    | 495                                                                               | 424                                                                               | 0    | 0     | 587                                                                                 | 0    |      |
| Turn Type               | Perm  | NA                                                                                | pm+ov                                                                             | Perm  | NA                                                                                |      | D,P+P                                                                             | NA                                                                                |      | Perm  | NA                                                                                  |      |      |
| Protected Phases        |       | 4                                                                                 | 1                                                                                 |       | 4                                                                                 |      | 1                                                                                 | 1 2                                                                               |      |       | 2                                                                                   |      | 3    |
| Permitted Phases        | 4     |                                                                                   | 4                                                                                 | 4     |                                                                                   |      | 2                                                                                 |                                                                                   |      | 2     |                                                                                     |      |      |
| Detector Phase          | 4     | 4                                                                                 | 1                                                                                 | 4     | 4                                                                                 |      | 1                                                                                 | 1 2                                                                               |      | 2     | 2                                                                                   |      |      |
| Switch Phase            |       |                                                                                   |                                                                                   |       |                                                                                   |      |                                                                                   |                                                                                   |      |       |                                                                                     |      |      |
| Minimum Initial (s)     | 9.0   | 9.0                                                                               | 7.0                                                                               | 9.0   | 9.0                                                                               |      | 7.0                                                                               |                                                                                   |      | 6.0   | 6.0                                                                                 |      | 4.0  |
| Minimum Split (s)       | 14.0  | 14.0                                                                              | 12.0                                                                              | 14.0  | 14.0                                                                              |      | 12.0                                                                              |                                                                                   |      | 11.0  | 11.0                                                                                |      | 19.0 |
| Total Split (s)         | 15.0  | 15.0                                                                              | 22.0                                                                              | 15.0  | 15.0                                                                              |      | 22.0                                                                              |                                                                                   |      | 34.0  | 34.0                                                                                |      | 19.0 |
| Total Split (%)         | 16.7% | 16.7%                                                                             | 24.4%                                                                             | 16.7% | 16.7%                                                                             |      | 24.4%                                                                             |                                                                                   |      | 37.8% | 37.8%                                                                               |      | 21%  |
| Yellow Time (s)         | 4.0   | 4.0                                                                               | 4.0                                                                               | 4.0   | 4.0                                                                               |      | 4.0                                                                               |                                                                                   |      | 4.0   | 4.0                                                                                 |      | 4.0  |
| All-Red Time (s)        | 1.0   | 1.0                                                                               | 1.0                                                                               | 1.0   | 1.0                                                                               |      | 1.0                                                                               |                                                                                   |      | 1.0   | 1.0                                                                                 |      | 0.0  |
| Lost Time Adjust (s)    |       | 0.0                                                                               | 0.0                                                                               |       | 0.0                                                                               |      | 0.0                                                                               |                                                                                   |      |       | 0.0                                                                                 |      |      |
| Total Lost Time (s)     |       | 5.0                                                                               | 5.0                                                                               |       | 5.0                                                                               |      | 5.0                                                                               |                                                                                   |      |       | 5.0                                                                                 |      |      |
| Lead/Lag                | Lag   | Lag                                                                               | Lead                                                                              | Lag   | Lag                                                                               |      | Lead                                                                              |                                                                                   |      | Lag   | Lag                                                                                 |      | Lead |
| Lead-Lag Optimize?      |       |                                                                                   |                                                                                   |       |                                                                                   |      |                                                                                   |                                                                                   |      |       |                                                                                     |      |      |
| Recall Mode             | Min   | Min                                                                               | Max                                                                               | Min   | Min                                                                               |      | Max                                                                               |                                                                                   |      | Max   | Max                                                                                 |      | None |
| Act Effect Green (s)    |       | 9.9                                                                               | 27.0                                                                              |       | 9.9                                                                               |      | 46.4                                                                              | 51.5                                                                              |      |       | 29.3                                                                                |      |      |
| Actuated g/C Ratio      |       | 0.13                                                                              | 0.36                                                                              |       | 0.13                                                                              |      | 0.62                                                                              | 0.69                                                                              |      |       | 0.39                                                                                |      |      |
| v/c Ratio               |       | 0.30                                                                              | 0.72                                                                              |       | 0.68                                                                              |      | 0.80                                                                              | 0.32                                                                              |      |       | 0.80                                                                                |      |      |
| Control Delay           |       | 37.3                                                                              | 28.7                                                                              |       | 50.2                                                                              |      | 22.8                                                                              | 6.6                                                                               |      |       | 31.6                                                                                |      |      |
| Queue Delay             |       | 0.0                                                                               | 0.0                                                                               |       | 0.0                                                                               |      | 0.0                                                                               | 0.0                                                                               |      |       | 0.0                                                                                 |      |      |
| Total Delay             |       | 37.3                                                                              | 28.7                                                                              |       | 50.2                                                                              |      | 22.8                                                                              | 6.6                                                                               |      |       | 31.6                                                                                |      |      |
| LOS                     |       | D                                                                                 | C                                                                                 |       | D                                                                                 |      | C                                                                                 | A                                                                                 |      |       | C                                                                                   |      |      |
| Approach Delay          |       | 29.5                                                                              |                                                                                   |       | 50.2                                                                              |      |                                                                                   | 15.3                                                                              |      |       | 31.6                                                                                |      |      |
| Approach LOS            |       | C                                                                                 |                                                                                   |       | D                                                                                 |      |                                                                                   | B                                                                                 |      |       | C                                                                                   |      |      |
| Queue Length 50th (ft)  |       | 17                                                                                | 128                                                                               |       | 63                                                                                |      | 78                                                                                | 53                                                                                |      |       | 212                                                                                 |      |      |
| Queue Length 95th (ft)  |       | 58                                                                                | #388                                                                              |       | #189                                                                              |      | #375                                                                              | 188                                                                               |      |       | #542                                                                                |      |      |
| Internal Link Dist (ft) |       | 544                                                                               |                                                                                   |       | 307                                                                               |      |                                                                                   | 428                                                                               |      |       | 451                                                                                 |      |      |
| Turn Bay Length (ft)    |       |                                                                                   | 50                                                                                |       |                                                                                   |      | 75                                                                                |                                                                                   |      |       |                                                                                     |      |      |
| Base Capacity (vph)     |       | 153                                                                               | 574                                                                               |       | 226                                                                               |      | 620                                                                               | 1305                                                                              |      |       | 733                                                                                 |      |      |
| Starvation Cap Reductn  |       | 0                                                                                 | 0                                                                                 |       | 0                                                                                 |      | 0                                                                                 | 0                                                                                 |      |       | 0                                                                                   |      |      |
| Spillback Cap Reductn   |       | 0                                                                                 | 0                                                                                 |       | 0                                                                                 |      | 0                                                                                 | 0                                                                                 |      |       | 0                                                                                   |      |      |
| Storage Cap Reductn     |       | 0                                                                                 | 0                                                                                 |       | 0                                                                                 |      | 0                                                                                 | 0                                                                                 |      |       | 0                                                                                   |      |      |
| Reduced v/c Ratio       |       | 0.29                                                                              | 0.72                                                                              |       | 0.67                                                                              |      | 0.80                                                                              | 0.32                                                                              |      |       | 0.80                                                                                |      |      |

#### Intersection Summary

Area Type: Other

Cycle Length: 90

Actuated Cycle Length: 74.6

Natural Cycle: 90

Control Type: Semi Act-Uncoord

Maximum v/c Ratio: 0.80

Intersection Signal Delay: 25.4

Intersection LOS: C

Intersection Capacity Utilization 80.9%

ICU Level of Service D

Analysis Period (min) 15

# 95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

Splits and Phases: 17: Centre Street & Walnut Street

| Ø1                                                                                  | Ø2                                                                                  | Ø3                                                                                   | Ø4                                                                                    |
|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|
|  |  |  |  |
| 22 s                                                                                | 34 s                                                                                | 19 s                                                                                 | 15 s                                                                                  |
| Lanes, Volumes, Timings                                                             |                                                                                     |                                                                                      |                                                                                       |
| VHB/MSD                                                                             |                                                                                     |                                                                                      |                                                                                       |



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## Mitigation Intersection Capacity Analyses – With Existing Mode Share



|                         |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|-------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
| Lane Group              | EBL                                                                               | EBT                                                                               | EBR                                                                               | WBL                                                                               | WBT                                                                               | WBR                                                                               | NBL                                                                               | NBT                                                                               | NBR                                                                               | SBL                                                                                 | SBT                                                                                 | SBR                                                                                 | Ø3                                                                                  |                                                                                     |                                                                                     |                                                                                     |
| Lane Configurations     |                                                                                   |  |                                                                                   |                                                                                   |  |                                                                                   |                                                                                   |  |                                                                                   |                                                                                     |  |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Traffic Volume (vph)    | 370                                                                               | 270                                                                               | 40                                                                                | 5                                                                                 | 55                                                                                | 35                                                                                | 40                                                                                | 205                                                                               | 5                                                                                 | 30                                                                                  | 285                                                                                 | 170                                                                                 |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Future Volume (vph)     | 370                                                                               | 270                                                                               | 40                                                                                | 5                                                                                 | 55                                                                                | 35                                                                                | 40                                                                                | 205                                                                               | 5                                                                                 | 30                                                                                  | 285                                                                                 | 170                                                                                 |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Ideal Flow (vphpl)      | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                                | 1900                                                                                | 1900                                                                                |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Satd. Flow (prot)       | 0                                                                                 | 1832                                                                              | 0                                                                                 | 0                                                                                 | 1801                                                                              | 0                                                                                 | 0                                                                                 | 1843                                                                              | 0                                                                                 | 0                                                                                   | 1792                                                                                | 0                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Flt Permitted           |                                                                                   | 0.781                                                                             |                                                                                   |                                                                                   | 0.973                                                                             |                                                                                   |                                                                                   | 0.767                                                                             |                                                                                   |                                                                                     | 0.967                                                                               |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Satd. Flow (perm)       | 0                                                                                 | 1470                                                                              | 0                                                                                 | 0                                                                                 | 1756                                                                              | 0                                                                                 | 0                                                                                 | 1425                                                                              | 0                                                                                 | 0                                                                                   | 1738                                                                                | 0                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Right Turn on Red       |                                                                                   |                                                                                   | Yes                                                                               |                                                                                   |                                                                                   | Yes                                                                               |                                                                                   |                                                                                   | Yes                                                                               |                                                                                     |                                                                                     | Yes                                                                                 |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Satd. Flow (RTOR)       |                                                                                   | 3                                                                                 |                                                                                   |                                                                                   | 32                                                                                |                                                                                   |                                                                                   | 1                                                                                 |                                                                                   |                                                                                     | 23                                                                                  |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Link Speed (mph)        |                                                                                   | 30                                                                                |                                                                                   |                                                                                   | 30                                                                                |                                                                                   |                                                                                   | 30                                                                                |                                                                                   |                                                                                     | 30                                                                                  |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Link Distance (ft)      |                                                                                   | 764                                                                               |                                                                                   |                                                                                   | 972                                                                               |                                                                                   |                                                                                   | 2055                                                                              |                                                                                   |                                                                                     | 1553                                                                                |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Travel Time (s)         |                                                                                   | 17.4                                                                              |                                                                                   |                                                                                   | 22.1                                                                              |                                                                                   |                                                                                   | 46.7                                                                              |                                                                                   |                                                                                     | 35.3                                                                                |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Confl. Peds. (#/hr)     |                                                                                   |                                                                                   | 1                                                                                 | 1                                                                                 |                                                                                   |                                                                                   | 1                                                                                 |                                                                                   | 1                                                                                 | 1                                                                                   |                                                                                     | 1                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Peak Hour Factor        | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                                | 0.92                                                                                | 0.92                                                                                |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Heavy Vehicles (%)      | 0%                                                                                | 0%                                                                                | 0%                                                                                | 0%                                                                                | 0%                                                                                | 0%                                                                                | 2%                                                                                | 2%                                                                                | 2%                                                                                | 0%                                                                                  | 0%                                                                                  | 0%                                                                                  |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Shared Lane Traffic (%) |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Lane Group Flow (vph)   | 0                                                                                 | 738                                                                               | 0                                                                                 | 0                                                                                 | 103                                                                               | 0                                                                                 | 0                                                                                 | 271                                                                               | 0                                                                                 | 0                                                                                   | 528                                                                                 | 0                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Turn Type               | Perm                                                                              | NA                                                                                |                                                                                   | Perm                                                                              | NA                                                                                |                                                                                   | Perm                                                                              | NA                                                                                |                                                                                   | Perm                                                                                | NA                                                                                  |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Protected Phases        |                                                                                   | 1                                                                                 |                                                                                   |                                                                                   | 1                                                                                 |                                                                                   |                                                                                   | 2                                                                                 |                                                                                   |                                                                                     | 2                                                                                   |                                                                                     | 3                                                                                   |                                                                                     |                                                                                     |                                                                                     |
| Permitted Phases        | 1                                                                                 |                                                                                   |                                                                                   | 1                                                                                 |                                                                                   |                                                                                   | 2                                                                                 |                                                                                   |                                                                                   | 2                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Detector Phase          | 1                                                                                 | 1                                                                                 |                                                                                   | 1                                                                                 | 1                                                                                 |                                                                                   | 2                                                                                 | 2                                                                                 |                                                                                   | 2                                                                                   | 2                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Switch Phase            |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Minimum Initial (s)     | 6.0                                                                               | 6.0                                                                               |                                                                                   | 6.0                                                                               | 6.0                                                                               |                                                                                   | 6.0                                                                               | 6.0                                                                               |                                                                                   | 6.0                                                                                 | 6.0                                                                                 |                                                                                     | 4.0                                                                                 |                                                                                     |                                                                                     |                                                                                     |
| Minimum Split (s)       | 11.0                                                                              | 11.0                                                                              |                                                                                   | 11.0                                                                              | 11.0                                                                              |                                                                                   | 11.0                                                                              | 11.0                                                                              |                                                                                   | 11.0                                                                                | 11.0                                                                                |                                                                                     | 19.0                                                                                |                                                                                     |                                                                                     |                                                                                     |
| Total Split (s)         | 60.0                                                                              | 60.0                                                                              |                                                                                   | 60.0                                                                              | 60.0                                                                              |                                                                                   | 40.0                                                                              | 40.0                                                                              |                                                                                   | 40.0                                                                                | 40.0                                                                                |                                                                                     | 20.0                                                                                |                                                                                     |                                                                                     |                                                                                     |
| Total Split (%)         | 50.0%                                                                             | 50.0%                                                                             |                                                                                   | 50.0%                                                                             | 50.0%                                                                             |                                                                                   | 33.3%                                                                             | 33.3%                                                                             |                                                                                   | 33.3%                                                                               | 33.3%                                                                               |                                                                                     | 17%                                                                                 |                                                                                     |                                                                                     |                                                                                     |
| Yellow Time (s)         | 3.0                                                                               | 3.0                                                                               |                                                                                   | 3.0                                                                               | 3.0                                                                               |                                                                                   | 3.0                                                                               | 3.0                                                                               |                                                                                   | 3.0                                                                                 | 3.0                                                                                 |                                                                                     | 3.0                                                                                 |                                                                                     |                                                                                     |                                                                                     |
| All-Red Time (s)        | 2.0                                                                               | 2.0                                                                               |                                                                                   | 2.0                                                                               | 2.0                                                                               |                                                                                   | 2.0                                                                               | 2.0                                                                               |                                                                                   | 2.0                                                                                 | 2.0                                                                                 |                                                                                     | 1.0                                                                                 |                                                                                     |                                                                                     |                                                                                     |
| Lost Time Adjust (s)    |                                                                                   | 0.0                                                                               |                                                                                   |                                                                                   | 0.0                                                                               |                                                                                   |                                                                                   | 0.0                                                                               |                                                                                   |                                                                                     | 0.0                                                                                 |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Total Lost Time (s)     |                                                                                   | 5.0                                                                               |                                                                                   |                                                                                   | 5.0                                                                               |                                                                                   |                                                                                   | 5.0                                                                               |                                                                                   |                                                                                     | 5.0                                                                                 |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Lead/Lag                | Lead                                                                              | Lead                                                                              |                                                                                   | Lead                                                                              | Lead                                                                              |                                                                                   | Lag                                                                               | Lag                                                                               |                                                                                   | Lag                                                                                 | Lag                                                                                 |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Lead-Lag Optimize?      |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Recall Mode             | None                                                                              | None                                                                              |                                                                                   | None                                                                              | None                                                                              |                                                                                   | None                                                                              | None                                                                              |                                                                                   | None                                                                                | None                                                                                |                                                                                     | None                                                                                |                                                                                     |                                                                                     |                                                                                     |
| Act Efect Green (s)     |                                                                                   | 55.3                                                                              |                                                                                   |                                                                                   | 55.3                                                                              |                                                                                   |                                                                                   | 35.2                                                                              |                                                                                   |                                                                                     | 35.2                                                                                |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Actuated g/C Ratio      |                                                                                   | 0.53                                                                              |                                                                                   |                                                                                   | 0.53                                                                              |                                                                                   |                                                                                   | 0.34                                                                              |                                                                                   |                                                                                     | 0.34                                                                                |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| v/c Ratio               |                                                                                   | 0.94                                                                              |                                                                                   |                                                                                   | 0.11                                                                              |                                                                                   |                                                                                   | 0.56                                                                              |                                                                                   |                                                                                     | 0.87                                                                                |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Control Delay           |                                                                                   | 45.5                                                                              |                                                                                   |                                                                                   | 9.9                                                                               |                                                                                   |                                                                                   | 34.6                                                                              |                                                                                   |                                                                                     | 48.6                                                                                |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Queue Delay             |                                                                                   | 0.0                                                                               |                                                                                   |                                                                                   | 0.0                                                                               |                                                                                   |                                                                                   | 0.0                                                                               |                                                                                   |                                                                                     | 0.0                                                                                 |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Total Delay             |                                                                                   | 45.5                                                                              |                                                                                   |                                                                                   | 9.9                                                                               |                                                                                   |                                                                                   | 34.6                                                                              |                                                                                   |                                                                                     | 48.6                                                                                |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| LOS                     |                                                                                   | D                                                                                 |                                                                                   |                                                                                   | A                                                                                 |                                                                                   |                                                                                   | C                                                                                 |                                                                                   |                                                                                     | D                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Approach Delay          |                                                                                   | 45.5                                                                              |                                                                                   |                                                                                   | 9.9                                                                               |                                                                                   |                                                                                   | 34.6                                                                              |                                                                                   |                                                                                     | 48.6                                                                                |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Approach LOS            |                                                                                   | D                                                                                 |                                                                                   |                                                                                   | A                                                                                 |                                                                                   |                                                                                   | C                                                                                 |                                                                                   |                                                                                     | D                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Queue Length 50th (ft)  |                                                                                   | 400                                                                               |                                                                                   |                                                                                   | 20                                                                                |                                                                                   |                                                                                   | 137                                                                               |                                                                                   |                                                                                     | 296                                                                                 |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Queue Length 95th (ft)  |                                                                                   | #876                                                                              |                                                                                   |                                                                                   | 63                                                                                |                                                                                   |                                                                                   | 278                                                                               |                                                                                   |                                                                                     | #627                                                                                |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Internal Link Dist (ft) |                                                                                   | 684                                                                               |                                                                                   |                                                                                   | 892                                                                               |                                                                                   |                                                                                   | 1975                                                                              |                                                                                   |                                                                                     | 1473                                                                                |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Turn Bay Length (ft)    |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Base Capacity (vph)     |                                                                                   | 783                                                                               |                                                                                   |                                                                                   | 950                                                                               |                                                                                   |                                                                                   | 483                                                                               |                                                                                   |                                                                                     | 604                                                                                 |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Starvation Cap Reductn  |                                                                                   | 0                                                                                 |                                                                                   |                                                                                   | 0                                                                                 |                                                                                   |                                                                                   | 0                                                                                 |                                                                                   |                                                                                     | 0                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Spillback Cap Reductn   |                                                                                   | 0                                                                                 |                                                                                   |                                                                                   | 0                                                                                 |                                                                                   |                                                                                   | 0                                                                                 |                                                                                   |                                                                                     | 0                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Storage Cap Reductn     |                                                                                   | 0                                                                                 |                                                                                   |                                                                                   | 0                                                                                 |                                                                                   |                                                                                   | 0                                                                                 |                                                                                   |                                                                                     | 0                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Reduced v/c Ratio       |                                                                                   | 0.94                                                                              |                                                                                   |                                                                                   | 0.11                                                                              |                                                                                   |                                                                                   | 0.56                                                                              |                                                                                   |                                                                                     | 0.87                                                                                |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |

#### Intersection Summary

Area Type: Other

Cycle Length: 120

Actuated Cycle Length: 103.8

Natural Cycle: 130

Control Type: Actuated-Uncoordinated

Maximum v/c Ratio: 0.94

Intersection Signal Delay: 42.4

Intersection LOS: D

Intersection Capacity Utilization 82.2%

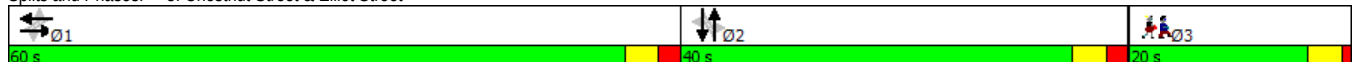
ICU Level of Service E

Analysis Period (min) 15

# 95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

Splits and Phases: 3: Chestnut Street & Elliot Street



| Lane Group              | SEL   | SET                                                                               | SER                                                                               | NWL   | NWT                                                                               | NWR  | NEL                                                                               | NET                                                                               | NER  | SWL   | SWT                                                                                 | SWR  | Ø3   |
|-------------------------|-------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-------|-----------------------------------------------------------------------------------|------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|------|-------|-------------------------------------------------------------------------------------|------|------|
| Lane Configurations     |       |  |  |       |  |      |  |  |      |       |  |      |      |
| Traffic Volume (vph)    | 20    | 1                                                                                 | 405                                                                               | 35    | 40                                                                                | 0    | 400                                                                               | 705                                                                               | 2    | 1     | 735                                                                                 | 30   |      |
| Future Volume (vph)     | 20    | 1                                                                                 | 405                                                                               | 35    | 40                                                                                | 0    | 400                                                                               | 705                                                                               | 2    | 1     | 735                                                                                 | 30   |      |
| Ideal Flow (vphpl)      | 1900  | 1900                                                                              | 1900                                                                              | 1900  | 1900                                                                              | 1900 | 1900                                                                              | 1900                                                                              | 1900 | 1900  | 1900                                                                                | 1900 |      |
| Storage Length (ft)     | 0     |                                                                                   | 50                                                                                | 0     |                                                                                   | 0    | 75                                                                                |                                                                                   | 0    | 0     |                                                                                     | 0    |      |
| Storage Lanes           | 0     |                                                                                   | 1                                                                                 | 0     |                                                                                   | 0    | 1                                                                                 |                                                                                   | 0    | 0     |                                                                                     | 0    |      |
| Taper Length (ft)       | 25    |                                                                                   |                                                                                   | 25    |                                                                                   |      | 25                                                                                |                                                                                   |      | 25    |                                                                                     |      |      |
| Satd. Flow (prot)       | 0     | 1813                                                                              | 1615                                                                              | 0     | 1856                                                                              | 0    | 1770                                                                              | 1863                                                                              | 0    | 0     | 1889                                                                                | 0    |      |
| Flt Permitted           |       | 0.692                                                                             |                                                                                   |       | 0.839                                                                             |      | 0.209                                                                             |                                                                                   |      |       |                                                                                     |      |      |
| Satd. Flow (perm)       | 0     | 1230                                                                              | 1571                                                                              | 0     | 1578                                                                              | 0    | 389                                                                               | 1863                                                                              | 0    | 0     | 1889                                                                                | 0    |      |
| Right Turn on Red       |       |                                                                                   | No                                                                                |       |                                                                                   | No   |                                                                                   |                                                                                   | Yes  |       |                                                                                     | Yes  |      |
| Satd. Flow (RTOR)       |       |                                                                                   |                                                                                   |       |                                                                                   |      |                                                                                   |                                                                                   |      |       | 2                                                                                   |      |      |
| Link Speed (mph)        |       | 30                                                                                |                                                                                   |       | 30                                                                                |      |                                                                                   | 30                                                                                |      |       | 30                                                                                  |      |      |
| Link Distance (ft)      |       | 624                                                                               |                                                                                   |       | 387                                                                               |      |                                                                                   | 508                                                                               |      |       | 531                                                                                 |      |      |
| Travel Time (s)         |       | 14.2                                                                              |                                                                                   |       | 8.8                                                                               |      |                                                                                   | 11.5                                                                              |      |       | 12.1                                                                                |      |      |
| Confl. Peds. (#/hr)     | 17    |                                                                                   | 4                                                                                 | 4     |                                                                                   | 17   | 3                                                                                 |                                                                                   | 9    | 9     |                                                                                     | 3    |      |
| Peak Hour Factor        | 0.92  | 0.92                                                                              | 0.92                                                                              | 0.92  | 0.92                                                                              | 0.92 | 0.92                                                                              | 0.92                                                                              | 0.92 | 0.92  | 0.92                                                                                | 0.92 |      |
| Heavy Vehicles (%)      | 0%    | 0%                                                                                | 0%                                                                                | 0%    | 0%                                                                                | 0%   | 2%                                                                                | 2%                                                                                | 2%   | 0%    | 0%                                                                                  | 0%   |      |
| Shared Lane Traffic (%) |       |                                                                                   |                                                                                   |       |                                                                                   |      |                                                                                   |                                                                                   |      |       |                                                                                     |      |      |
| Lane Group Flow (vph)   | 0     | 23                                                                                | 440                                                                               | 0     | 81                                                                                | 0    | 435                                                                               | 768                                                                               | 0    | 0     | 833                                                                                 | 0    |      |
| Turn Type               | Perm  | NA                                                                                | pm+ov                                                                             | Perm  | NA                                                                                |      | D,P+P                                                                             | NA                                                                                |      | Perm  | NA                                                                                  |      |      |
| Protected Phases        |       | 4                                                                                 | 1                                                                                 |       | 4                                                                                 |      | 1                                                                                 | 1 2                                                                               |      |       | 2                                                                                   |      | 3    |
| Permitted Phases        | 4     |                                                                                   | 4                                                                                 | 4     |                                                                                   |      | 2                                                                                 |                                                                                   |      | 2     |                                                                                     |      |      |
| Detector Phase          | 4     | 4                                                                                 | 1                                                                                 | 4     | 4                                                                                 |      | 1                                                                                 | 1 2                                                                               |      | 2     | 2                                                                                   |      |      |
| Switch Phase            |       |                                                                                   |                                                                                   |       |                                                                                   |      |                                                                                   |                                                                                   |      |       |                                                                                     |      |      |
| Minimum Initial (s)     | 9.0   | 9.0                                                                               | 7.0                                                                               | 9.0   | 9.0                                                                               |      | 7.0                                                                               |                                                                                   |      | 6.0   | 6.0                                                                                 |      | 4.0  |
| Minimum Split (s)       | 14.0  | 14.0                                                                              | 12.0                                                                              | 14.0  | 14.0                                                                              |      | 12.0                                                                              |                                                                                   |      | 11.0  | 11.0                                                                                |      | 19.0 |
| Total Split (s)         | 15.0  | 15.0                                                                              | 25.0                                                                              | 15.0  | 15.0                                                                              |      | 25.0                                                                              |                                                                                   |      | 51.0  | 51.0                                                                                |      | 19.0 |
| Total Split (%)         | 13.6% | 13.6%                                                                             | 22.7%                                                                             | 13.6% | 13.6%                                                                             |      | 22.7%                                                                             |                                                                                   |      | 46.4% | 46.4%                                                                               |      | 17%  |
| Yellow Time (s)         | 4.0   | 4.0                                                                               | 4.0                                                                               | 4.0   | 4.0                                                                               |      | 4.0                                                                               |                                                                                   |      | 4.0   | 4.0                                                                                 |      | 4.0  |
| All-Red Time (s)        | 1.0   | 1.0                                                                               | 1.0                                                                               | 1.0   | 1.0                                                                               |      | 1.0                                                                               |                                                                                   |      | 1.0   | 1.0                                                                                 |      | 0.0  |
| Lost Time Adjust (s)    |       | 0.0                                                                               | 0.0                                                                               |       | 0.0                                                                               |      | 0.0                                                                               |                                                                                   |      |       | 0.0                                                                                 |      |      |
| Total Lost Time (s)     |       | 5.0                                                                               | 5.0                                                                               |       | 5.0                                                                               |      | 5.0                                                                               |                                                                                   |      |       | 5.0                                                                                 |      |      |
| Lead/Lag                | Lag   | Lag                                                                               | Lead                                                                              | Lag   | Lag                                                                               |      | Lead                                                                              |                                                                                   |      | Lag   | Lag                                                                                 |      | Lead |
| Lead-Lag Optimize?      |       |                                                                                   |                                                                                   |       |                                                                                   |      |                                                                                   |                                                                                   |      |       |                                                                                     |      |      |
| Recall Mode             | Min   | Min                                                                               | Max                                                                               | Min   | Min                                                                               |      | Max                                                                               |                                                                                   |      | Max   | Max                                                                                 |      | None |
| Act Effct Green (s)     |       | 9.6                                                                               | 29.8                                                                              |       | 9.6                                                                               |      | 66.6                                                                              | 71.7                                                                              |      |       | 46.4                                                                                |      |      |
| Actuated g/C Ratio      |       | 0.09                                                                              | 0.29                                                                              |       | 0.09                                                                              |      | 0.65                                                                              | 0.70                                                                              |      |       | 0.45                                                                                |      |      |
| v/c Ratio               |       | 0.20                                                                              | 0.94                                                                              |       | 0.54                                                                              |      | 0.83                                                                              | 0.59                                                                              |      |       | 0.97                                                                                |      |      |
| Control Delay           |       | 50.4                                                                              | 65.6                                                                              |       | 61.1                                                                              |      | 31.0                                                                              | 11.8                                                                              |      |       | 53.6                                                                                |      |      |
| Queue Delay             |       | 0.0                                                                               | 0.0                                                                               |       | 0.0                                                                               |      | 0.0                                                                               | 1.7                                                                               |      |       | 0.0                                                                                 |      |      |
| Total Delay             |       | 50.4                                                                              | 65.6                                                                              |       | 61.1                                                                              |      | 31.0                                                                              | 13.5                                                                              |      |       | 53.6                                                                                |      |      |
| LOS                     |       | D                                                                                 | E                                                                                 |       | E                                                                                 |      | C                                                                                 | B                                                                                 |      |       | D                                                                                   |      |      |
| Approach Delay          |       | 64.8                                                                              |                                                                                   |       | 61.1                                                                              |      | 19.8                                                                              |                                                                                   |      |       | 53.6                                                                                |      |      |
| Approach LOS            |       | E                                                                                 |                                                                                   |       | E                                                                                 |      | B                                                                                 |                                                                                   |      |       | D                                                                                   |      |      |
| Queue Length 50th (ft)  |       | 15                                                                                | ~293                                                                              |       | 56                                                                                |      | 172                                                                               | 300                                                                               |      |       | ~645                                                                                |      |      |
| Queue Length 95th (ft)  |       | 42                                                                                | #523                                                                              |       | #114                                                                              |      | #358                                                                              | 423                                                                               |      |       | #888                                                                                |      |      |
| Internal Link Dist (ft) |       | 544                                                                               |                                                                                   |       | 307                                                                               |      |                                                                                   | 428                                                                               |      |       | 451                                                                                 |      |      |
| Turn Bay Length (ft)    |       |                                                                                   | 50                                                                                |       |                                                                                   |      | 75                                                                                |                                                                                   |      |       |                                                                                     |      |      |
| Base Capacity (vph)     |       | 121                                                                               | 468                                                                               |       | 156                                                                               |      | 527                                                                               | 1309                                                                              |      |       | 861                                                                                 |      |      |
| Starvation Cap Reductn  |       | 0                                                                                 | 0                                                                                 |       | 0                                                                                 |      | 0                                                                                 | 355                                                                               |      |       | 0                                                                                   |      |      |
| Spillback Cap Reductn   |       | 0                                                                                 | 0                                                                                 |       | 0                                                                                 |      | 0                                                                                 | 0                                                                                 |      |       | 0                                                                                   |      |      |
| Storage Cap Reductn     |       | 0                                                                                 | 0                                                                                 |       | 0                                                                                 |      | 0                                                                                 | 0                                                                                 |      |       | 0                                                                                   |      |      |
| Reduced v/c Ratio       |       | 0.19                                                                              | 0.94                                                                              |       | 0.52                                                                              |      | 0.83                                                                              | 0.81                                                                              |      |       | 0.97                                                                                |      |      |

#### Intersection Summary

Area Type: Other

Cycle Length: 110

Actuated Cycle Length: 102

Natural Cycle: 110

Control Type: Semi Act-Uncoord

Maximum v/c Ratio: 0.97

Intersection Signal Delay: 40.1

Intersection LOS: D

Intersection Capacity Utilization 101.0%

ICU Level of Service G

Analysis Period (min) 15

~ Volume exceeds capacity, queue is theoretically infinite.

Queue shown is maximum after two cycles.

# 95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

Splits and Phases: 17: Centre Street & Walnut Street



|                         |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|-------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
| Lane Group              | EBL                                                                               | EBT                                                                               | EBR                                                                               | WBL                                                                               | WBT                                                                               | WBR                                                                               | NBL                                                                               | NBT                                                                               | NBR                                                                               | SBL                                                                                 | SBT                                                                                 | SBR                                                                                 | Ø3                                                                                  |                                                                                     |                                                                                     |                                                                                     |
| Lane Configurations     |                                                                                   |  |                                                                                   |                                                                                   |  |                                                                                   |                                                                                   |  |                                                                                   |                                                                                     |  |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Traffic Volume (vph)    | 165                                                                               | 245                                                                               | 55                                                                                | 10                                                                                | 195                                                                               | 45                                                                                | 90                                                                                | 285                                                                               | 5                                                                                 | 60                                                                                  | 340                                                                                 | 315                                                                                 |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Future Volume (vph)     | 165                                                                               | 245                                                                               | 55                                                                                | 10                                                                                | 195                                                                               | 45                                                                                | 90                                                                                | 285                                                                               | 5                                                                                 | 60                                                                                  | 340                                                                                 | 315                                                                                 |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Ideal Flow (vphpl)      | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                              | 1900                                                                                | 1900                                                                                | 1900                                                                                |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Satd. Flow (prot)       | 0                                                                                 | 1833                                                                              | 0                                                                                 | 0                                                                                 | 1843                                                                              | 0                                                                                 | 0                                                                                 | 1873                                                                              | 0                                                                                 | 0                                                                                   | 1762                                                                                | 0                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Flt Permitted           |                                                                                   | 0.691                                                                             |                                                                                   |                                                                                   | 0.976                                                                             |                                                                                   |                                                                                   | 0.618                                                                             |                                                                                   |                                                                                     | 0.933                                                                               |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Satd. Flow (perm)       | 0                                                                                 | 1288                                                                              | 0                                                                                 | 0                                                                                 | 1802                                                                              | 0                                                                                 | 0                                                                                 | 1171                                                                              | 0                                                                                 | 0                                                                                   | 1650                                                                                | 0                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Right Turn on Red       |                                                                                   |                                                                                   | Yes                                                                               |                                                                                   |                                                                                   | Yes                                                                               |                                                                                   |                                                                                   | Yes                                                                               |                                                                                     |                                                                                     | Yes                                                                                 |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Satd. Flow (RTOR)       |                                                                                   | 6                                                                                 |                                                                                   |                                                                                   | 10                                                                                |                                                                                   |                                                                                   | 1                                                                                 |                                                                                   |                                                                                     | 41                                                                                  |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Link Speed (mph)        |                                                                                   | 30                                                                                |                                                                                   |                                                                                   | 30                                                                                |                                                                                   |                                                                                   | 30                                                                                |                                                                                   |                                                                                     | 30                                                                                  |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Link Distance (ft)      |                                                                                   | 764                                                                               |                                                                                   |                                                                                   | 972                                                                               |                                                                                   |                                                                                   | 2055                                                                              |                                                                                   |                                                                                     | 1553                                                                                |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Travel Time (s)         |                                                                                   | 17.4                                                                              |                                                                                   |                                                                                   | 22.1                                                                              |                                                                                   |                                                                                   | 46.7                                                                              |                                                                                   |                                                                                     | 35.3                                                                                |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Confl. Peds. (#/hr)     | 2                                                                                 |                                                                                   | 2                                                                                 | 2                                                                                 |                                                                                   | 2                                                                                 | 3                                                                                 |                                                                                   | 5                                                                                 | 5                                                                                   |                                                                                     | 3                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Peak Hour Factor        | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                                | 0.92                                                                                | 0.92                                                                                |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Heavy Vehicles (%)      | 0%                                                                                | 0%                                                                                | 0%                                                                                | 0%                                                                                | 0%                                                                                | 0%                                                                                | 0%                                                                                | 0%                                                                                | 0%                                                                                | 0%                                                                                  | 0%                                                                                  | 0%                                                                                  |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Shared Lane Traffic (%) |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Lane Group Flow (vph)   | 0                                                                                 | 505                                                                               | 0                                                                                 | 0                                                                                 | 272                                                                               | 0                                                                                 | 0                                                                                 | 413                                                                               | 0                                                                                 | 0                                                                                   | 777                                                                                 | 0                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Turn Type               | Perm                                                                              | NA                                                                                |                                                                                   | Perm                                                                              | NA                                                                                |                                                                                   | Perm                                                                              | NA                                                                                |                                                                                   | Perm                                                                                | NA                                                                                  |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Protected Phases        |                                                                                   | 1                                                                                 |                                                                                   |                                                                                   | 1                                                                                 |                                                                                   |                                                                                   | 2                                                                                 |                                                                                   |                                                                                     | 2                                                                                   |                                                                                     | 3                                                                                   |                                                                                     |                                                                                     |                                                                                     |
| Permitted Phases        | 1                                                                                 |                                                                                   |                                                                                   | 1                                                                                 |                                                                                   |                                                                                   | 2                                                                                 |                                                                                   |                                                                                   | 2                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Detector Phase          | 1                                                                                 | 1                                                                                 |                                                                                   | 1                                                                                 | 1                                                                                 |                                                                                   | 2                                                                                 | 2                                                                                 |                                                                                   | 2                                                                                   | 2                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Switch Phase            |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Minimum Initial (s)     | 6.0                                                                               | 6.0                                                                               |                                                                                   | 6.0                                                                               | 6.0                                                                               |                                                                                   | 6.0                                                                               | 6.0                                                                               |                                                                                   | 6.0                                                                                 | 6.0                                                                                 |                                                                                     | 4.0                                                                                 |                                                                                     |                                                                                     |                                                                                     |
| Minimum Split (s)       | 11.0                                                                              | 11.0                                                                              |                                                                                   | 11.0                                                                              | 11.0                                                                              |                                                                                   | 11.0                                                                              | 11.0                                                                              |                                                                                   | 11.0                                                                                | 11.0                                                                                |                                                                                     | 19.0                                                                                |                                                                                     |                                                                                     |                                                                                     |
| Total Split (s)         | 45.0                                                                              | 45.0                                                                              |                                                                                   | 45.0                                                                              | 45.0                                                                              |                                                                                   | 56.0                                                                              | 56.0                                                                              |                                                                                   | 56.0                                                                                | 56.0                                                                                |                                                                                     | 19.0                                                                                |                                                                                     |                                                                                     |                                                                                     |
| Total Split (%)         | 37.5%                                                                             | 37.5%                                                                             |                                                                                   | 37.5%                                                                             | 37.5%                                                                             |                                                                                   | 46.7%                                                                             | 46.7%                                                                             |                                                                                   | 46.7%                                                                               | 46.7%                                                                               |                                                                                     | 16%                                                                                 |                                                                                     |                                                                                     |                                                                                     |
| Yellow Time (s)         | 3.0                                                                               | 3.0                                                                               |                                                                                   | 3.0                                                                               | 3.0                                                                               |                                                                                   | 3.0                                                                               | 3.0                                                                               |                                                                                   | 3.0                                                                                 | 3.0                                                                                 |                                                                                     | 3.0                                                                                 |                                                                                     |                                                                                     |                                                                                     |
| All-Red Time (s)        | 2.0                                                                               | 2.0                                                                               |                                                                                   | 2.0                                                                               | 2.0                                                                               |                                                                                   | 2.0                                                                               | 2.0                                                                               |                                                                                   | 2.0                                                                                 | 2.0                                                                                 |                                                                                     | 1.0                                                                                 |                                                                                     |                                                                                     |                                                                                     |
| Lost Time Adjust (s)    |                                                                                   | 0.0                                                                               |                                                                                   |                                                                                   | 0.0                                                                               |                                                                                   |                                                                                   | 0.0                                                                               |                                                                                   |                                                                                     | 0.0                                                                                 |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Total Lost Time (s)     |                                                                                   | 5.0                                                                               |                                                                                   |                                                                                   | 5.0                                                                               |                                                                                   |                                                                                   | 5.0                                                                               |                                                                                   |                                                                                     | 5.0                                                                                 |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Lead/Lag                | Lead                                                                              | Lead                                                                              |                                                                                   | Lead                                                                              | Lead                                                                              |                                                                                   | Lag                                                                               | Lag                                                                               |                                                                                   | Lag                                                                                 | Lag                                                                                 |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Lead-Lag Optimize?      |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Recall Mode             | None                                                                              | None                                                                              |                                                                                   | None                                                                              | None                                                                              |                                                                                   | None                                                                              | None                                                                              |                                                                                   | None                                                                                | None                                                                                |                                                                                     | None                                                                                |                                                                                     |                                                                                     |                                                                                     |
| Act Effct Green (s)     |                                                                                   | 40.2                                                                              |                                                                                   |                                                                                   | 40.2                                                                              |                                                                                   |                                                                                   | 51.2                                                                              |                                                                                   |                                                                                     | 51.2                                                                                |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Actuated g/C Ratio      |                                                                                   | 0.38                                                                              |                                                                                   |                                                                                   | 0.38                                                                              |                                                                                   |                                                                                   | 0.49                                                                              |                                                                                   |                                                                                     | 0.49                                                                                |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| v/c Ratio               |                                                                                   | 1.02                                                                              |                                                                                   |                                                                                   | 0.39                                                                              |                                                                                   |                                                                                   | 0.72                                                                              |                                                                                   |                                                                                     | 0.94                                                                                |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Control Delay           |                                                                                   | 77.8                                                                              |                                                                                   |                                                                                   | 25.7                                                                              |                                                                                   |                                                                                   | 31.4                                                                              |                                                                                   |                                                                                     | 45.3                                                                                |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Queue Delay             |                                                                                   | 0.0                                                                               |                                                                                   |                                                                                   | 0.0                                                                               |                                                                                   |                                                                                   | 0.0                                                                               |                                                                                   |                                                                                     | 0.0                                                                                 |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Total Delay             |                                                                                   | 77.8                                                                              |                                                                                   |                                                                                   | 25.7                                                                              |                                                                                   |                                                                                   | 31.4                                                                              |                                                                                   |                                                                                     | 45.3                                                                                |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| LOS                     |                                                                                   | E                                                                                 |                                                                                   |                                                                                   | C                                                                                 |                                                                                   |                                                                                   | C                                                                                 |                                                                                   |                                                                                     | D                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Approach Delay          |                                                                                   | 77.8                                                                              |                                                                                   |                                                                                   | 25.7                                                                              |                                                                                   |                                                                                   | 31.4                                                                              |                                                                                   |                                                                                     | 45.3                                                                                |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Approach LOS            |                                                                                   | E                                                                                 |                                                                                   |                                                                                   | C                                                                                 |                                                                                   |                                                                                   | C                                                                                 |                                                                                   |                                                                                     | D                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Queue Length 50th (ft)  |                                                                                   | 313                                                                               |                                                                                   |                                                                                   | 117                                                                               |                                                                                   |                                                                                   | 195                                                                               |                                                                                   |                                                                                     | 422                                                                                 |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Queue Length 95th (ft)  |                                                                                   | #678                                                                              |                                                                                   |                                                                                   | 240                                                                               |                                                                                   |                                                                                   | #463                                                                              |                                                                                   |                                                                                     | #893                                                                                |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Internal Link Dist (ft) |                                                                                   | 684                                                                               |                                                                                   |                                                                                   | 892                                                                               |                                                                                   |                                                                                   | 1975                                                                              |                                                                                   |                                                                                     | 1473                                                                                |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Turn Bay Length (ft)    |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Base Capacity (vph)     |                                                                                   | 497                                                                               |                                                                                   |                                                                                   | 697                                                                               |                                                                                   |                                                                                   | 572                                                                               |                                                                                   |                                                                                     | 827                                                                                 |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Starvation Cap Reductn  |                                                                                   | 0                                                                                 |                                                                                   |                                                                                   | 0                                                                                 |                                                                                   |                                                                                   | 0                                                                                 |                                                                                   |                                                                                     | 0                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Spillback Cap Reductn   |                                                                                   | 0                                                                                 |                                                                                   |                                                                                   | 0                                                                                 |                                                                                   |                                                                                   | 0                                                                                 |                                                                                   |                                                                                     | 0                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Storage Cap Reductn     |                                                                                   | 0                                                                                 |                                                                                   |                                                                                   | 0                                                                                 |                                                                                   |                                                                                   | 0                                                                                 |                                                                                   |                                                                                     | 0                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Reduced v/c Ratio       |                                                                                   | 1.02                                                                              |                                                                                   |                                                                                   | 0.39                                                                              |                                                                                   |                                                                                   | 0.72                                                                              |                                                                                   |                                                                                     | 0.94                                                                                |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |

#### Intersection Summary

Area Type: Other

Cycle Length: 120

Actuated Cycle Length: 104.8

Natural Cycle: 150

Control Type: Actuated-Uncoordinated

Maximum v/c Ratio: 1.02

Intersection Signal Delay: 48.0

Intersection LOS: D

Intersection Capacity Utilization 95.7%

ICU Level of Service F

Analysis Period (min) 15

# 95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

Splits and Phases: 3: Chestnut Street & Elliot Street

|                                                                                     |                                                                                     |                                                                                       |
|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|
|  |  |  |
| 45 s                                                                                | 56 s                                                                                | 19 s                                                                                  |



| Lane Group              | SEL   | SET                                                                               | SER                                                                               | NWL   | NWT                                                                               | NWR  | NEL                                                                               | NET                                                                               | NER  | SWL   | SWT                                                                                 | SWR  | Ø3   |
|-------------------------|-------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-------|-----------------------------------------------------------------------------------|------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|------|-------|-------------------------------------------------------------------------------------|------|------|
| Lane Configurations     |       |  |  |       |  |      |  |  |      |       |  |      |      |
| Traffic Volume (vph)    | 30    | 2                                                                                 | 445                                                                               | 15    | 50                                                                                | 0    | 435                                                                               | 620                                                                               | 10   | 2     | 650                                                                                 | 60   |      |
| Future Volume (vph)     | 30    | 2                                                                                 | 445                                                                               | 15    | 50                                                                                | 0    | 435                                                                               | 620                                                                               | 10   | 2     | 650                                                                                 | 60   |      |
| Ideal Flow (vphpl)      | 1900  | 1900                                                                              | 1900                                                                              | 1900  | 1900                                                                              | 1900 | 1900                                                                              | 1900                                                                              | 1900 | 1900  | 1900                                                                                | 1900 |      |
| Storage Length (ft)     | 0     |                                                                                   | 50                                                                                | 0     |                                                                                   | 0    | 75                                                                                |                                                                                   | 0    | 0     |                                                                                     | 0    |      |
| Storage Lanes           | 0     |                                                                                   | 1                                                                                 | 0     |                                                                                   | 0    | 1                                                                                 |                                                                                   | 0    | 0     |                                                                                     | 0    |      |
| Taper Length (ft)       | 25    |                                                                                   |                                                                                   | 25    |                                                                                   |      | 25                                                                                |                                                                                   |      | 25    |                                                                                     |      |      |
| Satd. Flow (prot)       | 0     | 1814                                                                              | 1615                                                                              | 0     | 1879                                                                              | 0    | 1787                                                                              | 1877                                                                              | 0    | 0     | 1857                                                                                | 0    |      |
| Flt Permitted           |       | 0.720                                                                             |                                                                                   |       | 0.917                                                                             |      | 0.217                                                                             |                                                                                   |      |       | 0.999                                                                               |      |      |
| Satd. Flow (perm)       | 0     | 1308                                                                              | 1555                                                                              | 0     | 1721                                                                              | 0    | 408                                                                               | 1877                                                                              | 0    | 0     | 1855                                                                                | 0    |      |
| Right Turn on Red       |       |                                                                                   | No                                                                                |       |                                                                                   | No   |                                                                                   |                                                                                   | Yes  |       |                                                                                     | Yes  |      |
| Satd. Flow (RTOR)       |       |                                                                                   |                                                                                   |       |                                                                                   |      |                                                                                   | 2                                                                                 |      |       | 5                                                                                   |      |      |
| Link Speed (mph)        |       | 30                                                                                |                                                                                   |       | 30                                                                                |      |                                                                                   | 30                                                                                |      |       | 30                                                                                  |      |      |
| Link Distance (ft)      |       | 624                                                                               |                                                                                   |       | 387                                                                               |      |                                                                                   | 508                                                                               |      |       | 531                                                                                 |      |      |
| Travel Time (s)         |       | 14.2                                                                              |                                                                                   |       | 8.8                                                                               |      |                                                                                   | 11.5                                                                              |      |       | 12.1                                                                                |      |      |
| Confl. Peds. (#/hr)     | 11    |                                                                                   | 10                                                                                | 10    |                                                                                   | 11   | 4                                                                                 |                                                                                   | 8    | 8     |                                                                                     | 4    |      |
| Peak Hour Factor        | 0.92  | 0.92                                                                              | 0.92                                                                              | 0.92  | 0.92                                                                              | 0.92 | 0.92                                                                              | 0.92                                                                              | 0.92 | 0.92  | 0.92                                                                                | 0.92 |      |
| Heavy Vehicles (%)      | 0%    | 0%                                                                                | 0%                                                                                | 0%    | 0%                                                                                | 0%   | 1%                                                                                | 1%                                                                                | 1%   | 1%    | 1%                                                                                  | 1%   |      |
| Shared Lane Traffic (%) |       |                                                                                   |                                                                                   |       |                                                                                   |      |                                                                                   |                                                                                   |      |       |                                                                                     |      |      |
| Lane Group Flow (vph)   | 0     | 35                                                                                | 484                                                                               | 0     | 70                                                                                | 0    | 473                                                                               | 685                                                                               | 0    | 0     | 774                                                                                 | 0    |      |
| Turn Type               | Perm  | NA                                                                                | pm+ov                                                                             | Perm  | NA                                                                                |      | D,P+P                                                                             | NA                                                                                |      | Perm  | NA                                                                                  |      |      |
| Protected Phases        |       | 4                                                                                 | 1                                                                                 |       | 4                                                                                 |      | 1                                                                                 | 1 2                                                                               |      |       | 2                                                                                   |      | 3    |
| Permitted Phases        | 4     |                                                                                   | 4                                                                                 | 4     |                                                                                   |      | 2                                                                                 |                                                                                   |      | 2     |                                                                                     |      |      |
| Detector Phase          | 4     | 4                                                                                 | 1                                                                                 | 4     | 4                                                                                 |      | 1                                                                                 | 1 2                                                                               |      | 2     | 2                                                                                   |      |      |
| Switch Phase            |       |                                                                                   |                                                                                   |       |                                                                                   |      |                                                                                   |                                                                                   |      |       |                                                                                     |      |      |
| Minimum Initial (s)     | 9.0   | 9.0                                                                               | 7.0                                                                               | 9.0   | 9.0                                                                               |      | 7.0                                                                               |                                                                                   |      | 6.0   | 6.0                                                                                 |      | 4.0  |
| Minimum Split (s)       | 14.0  | 14.0                                                                              | 12.0                                                                              | 14.0  | 14.0                                                                              |      | 12.0                                                                              |                                                                                   |      | 11.0  | 11.0                                                                                |      | 19.0 |
| Total Split (s)         | 15.0  | 15.0                                                                              | 27.0                                                                              | 15.0  | 15.0                                                                              |      | 27.0                                                                              |                                                                                   |      | 49.0  | 49.0                                                                                |      | 19.0 |
| Total Split (%)         | 13.6% | 13.6%                                                                             | 24.5%                                                                             | 13.6% | 13.6%                                                                             |      | 24.5%                                                                             |                                                                                   |      | 44.5% | 44.5%                                                                               |      | 17%  |
| Yellow Time (s)         | 4.0   | 4.0                                                                               | 4.0                                                                               | 4.0   | 4.0                                                                               |      | 4.0                                                                               |                                                                                   |      | 4.0   | 4.0                                                                                 |      | 4.0  |
| All-Red Time (s)        | 1.0   | 1.0                                                                               | 1.0                                                                               | 1.0   | 1.0                                                                               |      | 1.0                                                                               |                                                                                   |      | 1.0   | 1.0                                                                                 |      | 0.0  |
| Lost Time Adjust (s)    |       | 0.0                                                                               | 0.0                                                                               |       | 0.0                                                                               |      | 0.0                                                                               |                                                                                   |      |       | 0.0                                                                                 |      |      |
| Total Lost Time (s)     |       | 5.0                                                                               | 5.0                                                                               |       | 5.0                                                                               |      | 5.0                                                                               |                                                                                   |      |       | 5.0                                                                                 |      |      |
| Lead/Lag                | Lag   | Lag                                                                               | Lead                                                                              | Lag   | Lag                                                                               |      | Lead                                                                              |                                                                                   |      | Lag   | Lag                                                                                 |      | Lead |
| Lead-Lag Optimize?      |       |                                                                                   |                                                                                   |       |                                                                                   |      |                                                                                   |                                                                                   |      |       |                                                                                     |      |      |
| Recall Mode             | Min   | Min                                                                               | Max                                                                               | Min   | Min                                                                               |      | Max                                                                               |                                                                                   |      | Max   | Max                                                                                 |      | None |
| Act Effct Green (s)     |       | 9.5                                                                               | 31.7                                                                              |       | 9.5                                                                               |      | 66.6                                                                              | 71.7                                                                              |      |       | 44.4                                                                                |      |      |
| Actuated g/C Ratio      |       | 0.09                                                                              | 0.31                                                                              |       | 0.09                                                                              |      | 0.65                                                                              | 0.70                                                                              |      |       | 0.44                                                                                |      |      |
| v/c Ratio               |       | 0.29                                                                              | 0.98                                                                              |       | 0.44                                                                              |      | 0.83                                                                              | 0.52                                                                              |      |       | 0.95                                                                                |      |      |
| Control Delay           |       | 52.8                                                                              | 70.7                                                                              |       | 55.6                                                                              |      | 31.3                                                                              | 10.4                                                                              |      |       | 52.5                                                                                |      |      |
| Queue Delay             |       | 0.0                                                                               | 0.0                                                                               |       | 0.0                                                                               |      | 0.0                                                                               | 1.2                                                                               |      |       | 0.0                                                                                 |      |      |
| Total Delay             |       | 52.8                                                                              | 70.7                                                                              |       | 55.6                                                                              |      | 31.3                                                                              | 11.6                                                                              |      |       | 52.5                                                                                |      |      |
| LOS                     |       | D                                                                                 | E                                                                                 |       | E                                                                                 |      | C                                                                                 | B                                                                                 |      |       | D                                                                                   |      |      |
| Approach Delay          |       | 69.5                                                                              |                                                                                   |       | 55.6                                                                              |      |                                                                                   | 19.6                                                                              |      |       | 52.5                                                                                |      |      |
| Approach LOS            |       | E                                                                                 |                                                                                   |       | E                                                                                 |      |                                                                                   | B                                                                                 |      |       | D                                                                                   |      |      |
| Queue Length 50th (ft)  |       | 24                                                                                | ~351                                                                              |       | 48                                                                                |      | 193                                                                               | 239                                                                               |      |       | ~579                                                                                |      |      |
| Queue Length 95th (ft)  |       | 57                                                                                | #574                                                                              |       | 95                                                                                |      | #393                                                                              | 346                                                                               |      |       | #827                                                                                |      |      |
| Internal Link Dist (ft) |       | 544                                                                               |                                                                                   |       | 307                                                                               |      |                                                                                   | 428                                                                               |      |       | 451                                                                                 |      |      |
| Turn Bay Length (ft)    |       |                                                                                   | 50                                                                                |       |                                                                                   |      | 75                                                                                |                                                                                   |      |       |                                                                                     |      |      |
| Base Capacity (vph)     |       | 129                                                                               | 496                                                                               |       | 170                                                                               |      | 567                                                                               | 1322                                                                              |      |       | 812                                                                                 |      |      |
| Starvation Cap Reductn  |       | 0                                                                                 | 0                                                                                 |       | 0                                                                                 |      | 0                                                                                 | 395                                                                               |      |       | 0                                                                                   |      |      |
| Spillback Cap Reductn   |       | 0                                                                                 | 0                                                                                 |       | 0                                                                                 |      | 0                                                                                 | 0                                                                                 |      |       | 0                                                                                   |      |      |
| Storage Cap Reductn     |       | 0                                                                                 | 0                                                                                 |       | 0                                                                                 |      | 0                                                                                 | 0                                                                                 |      |       | 0                                                                                   |      |      |
| Reduced v/c Ratio       |       | 0.27                                                                              | 0.98                                                                              |       | 0.41                                                                              |      | 0.83                                                                              | 0.74                                                                              |      |       | 0.95                                                                                |      |      |

#### Intersection Summary

Area Type: Other

Cycle Length: 110

Actuated Cycle Length: 101.8

Natural Cycle: 110

Control Type: Semi Act-Uncoord

Maximum v/c Ratio: 0.98

Intersection Signal Delay: 41.0

Intersection LOS: D

Intersection Capacity Utilization 93.9%

ICU Level of Service F

Analysis Period (min) 15

~ Volume exceeds capacity, queue is theoretically infinite.

Queue shown is maximum after two cycles.

# 95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

Splits and Phases: 17: Centre Street & Walnut Street



| Lane Group              | EBL   | EBT                                                                               | EBR  | WBL   | WBT                                                                               | WBR  | NBL   | NBT                                                                               | NBR  | SBL   | SBT                                                                                 | SBR  | Ø3   |
|-------------------------|-------|-----------------------------------------------------------------------------------|------|-------|-----------------------------------------------------------------------------------|------|-------|-----------------------------------------------------------------------------------|------|-------|-------------------------------------------------------------------------------------|------|------|
| Lane Configurations     |       |  |      |       |  |      |       |  |      |       |  |      |      |
| Traffic Volume (vph)    | 185   | 155                                                                               | 45   | 5     | 125                                                                               | 65   | 80    | 255                                                                               | 10   | 55    | 335                                                                                 | 195  |      |
| Future Volume (vph)     | 185   | 155                                                                               | 45   | 5     | 125                                                                               | 65   | 80    | 255                                                                               | 10   | 55    | 335                                                                                 | 195  |      |
| Ideal Flow (vphpl)      | 1900  | 1900                                                                              | 1900 | 1900  | 1900                                                                              | 1900 | 1900  | 1900                                                                              | 1900 | 1900  | 1900                                                                                | 1900 |      |
| Satd. Flow (prot)       | 0     | 1821                                                                              | 0    | 0     | 1773                                                                              | 0    | 0     | 1870                                                                              | 0    | 0     | 1789                                                                                | 0    |      |
| Fit Permitted           |       | 0.713                                                                             |      |       | 0.990                                                                             |      |       | 0.686                                                                             |      |       | 0.935                                                                               |      |      |
| Satd. Flow (perm)       | 0     | 1324                                                                              | 0    | 0     | 1757                                                                              | 0    | 0     | 1297                                                                              | 0    | 0     | 1681                                                                                | 0    |      |
| Right Turn on Red       |       |                                                                                   | Yes  |       |                                                                                   | Yes  |       |                                                                                   | Yes  |       |                                                                                     | Yes  |      |
| Satd. Flow (RTOR)       |       | 7                                                                                 |      |       | 25                                                                                |      |       | 2                                                                                 |      |       | 32                                                                                  |      |      |
| Link Speed (mph)        |       | 30                                                                                |      |       | 30                                                                                |      |       | 30                                                                                |      |       | 30                                                                                  |      |      |
| Link Distance (ft)      |       | 764                                                                               |      |       | 972                                                                               |      |       | 2055                                                                              |      |       | 1553                                                                                |      |      |
| Travel Time (s)         |       | 17.4                                                                              |      |       | 22.1                                                                              |      |       | 46.7                                                                              |      |       | 35.3                                                                                |      |      |
| Confl. Peds. (#/hr)     | 6     |                                                                                   | 4    | 4     |                                                                                   | 6    | 6     |                                                                                   | 2    | 2     |                                                                                     | 6    |      |
| Confl. Bikes (#/hr)     |       |                                                                                   |      |       |                                                                                   | 4    |       |                                                                                   | 2    |       |                                                                                     | 1    |      |
| Peak Hour Factor        | 0.92  | 0.92                                                                              | 0.92 | 0.92  | 0.92                                                                              | 0.92 | 0.92  | 0.92                                                                              | 0.92 | 0.92  | 0.92                                                                                | 0.92 |      |
| Heavy Vehicles (%)      | 0%    | 0%                                                                                | 0%   | 1%    | 1%                                                                                | 1%   | 0%    | 0%                                                                                | 0%   | 0%    | 0%                                                                                  | 0%   |      |
| Shared Lane Traffic (%) |       |                                                                                   |      |       |                                                                                   |      |       |                                                                                   |      |       |                                                                                     |      |      |
| Lane Group Flow (vph)   | 0     | 418                                                                               | 0    | 0     | 212                                                                               | 0    | 0     | 375                                                                               | 0    | 0     | 636                                                                                 | 0    |      |
| Turn Type               | Perm  | NA                                                                                |      | Perm  | NA                                                                                |      | Perm  | NA                                                                                |      | Perm  | NA                                                                                  |      |      |
| Protected Phases        |       | 1                                                                                 |      |       | 1                                                                                 |      |       | 2                                                                                 |      |       | 2                                                                                   |      | 3    |
| Permitted Phases        | 1     |                                                                                   |      | 1     |                                                                                   |      | 2     |                                                                                   |      | 2     |                                                                                     |      |      |
| Detector Phase          | 1     | 1                                                                                 |      | 1     | 1                                                                                 |      | 2     | 2                                                                                 |      | 2     | 2                                                                                   |      |      |
| Switch Phase            |       |                                                                                   |      |       |                                                                                   |      |       |                                                                                   |      |       |                                                                                     |      |      |
| Minimum Initial (s)     | 6.0   | 6.0                                                                               |      | 6.0   | 6.0                                                                               |      | 6.0   | 6.0                                                                               |      | 6.0   | 6.0                                                                                 |      | 4.0  |
| Minimum Split (s)       | 11.0  | 11.0                                                                              |      | 11.0  | 11.0                                                                              |      | 11.0  | 11.0                                                                              |      | 11.0  | 11.0                                                                                |      | 19.0 |
| Total Split (s)         | 32.0  | 32.0                                                                              |      | 32.0  | 32.0                                                                              |      | 49.0  | 49.0                                                                              |      | 49.0  | 49.0                                                                                |      | 19.0 |
| Total Split (%)         | 32.0% | 32.0%                                                                             |      | 32.0% | 32.0%                                                                             |      | 49.0% | 49.0%                                                                             |      | 49.0% | 49.0%                                                                               |      | 19%  |
| Yellow Time (s)         | 3.0   | 3.0                                                                               |      | 3.0   | 3.0                                                                               |      | 3.0   | 3.0                                                                               |      | 3.0   | 3.0                                                                                 |      | 3.0  |
| All-Red Time (s)        | 2.0   | 2.0                                                                               |      | 2.0   | 2.0                                                                               |      | 2.0   | 2.0                                                                               |      | 2.0   | 2.0                                                                                 |      | 1.0  |
| Lost Time Adjust (s)    |       | 0.0                                                                               |      |       | 0.0                                                                               |      |       | 0.0                                                                               |      |       | 0.0                                                                                 |      |      |
| Total Lost Time (s)     |       | 5.0                                                                               |      |       | 5.0                                                                               |      |       | 5.0                                                                               |      |       | 5.0                                                                                 |      |      |
| Lead/Lag                | Lead  | Lead                                                                              |      | Lead  | Lead                                                                              |      | Lag   | Lag                                                                               |      | Lag   | Lag                                                                                 |      |      |
| Lead-Lag Optimize?      |       |                                                                                   |      |       |                                                                                   |      |       |                                                                                   |      |       |                                                                                     |      |      |
| Recall Mode             | None  | None                                                                              |      | None  | None                                                                              |      | None  | None                                                                              |      | None  | None                                                                                |      | None |
| Act Effect Green (s)    |       | 28.5                                                                              |      |       | 28.5                                                                              |      |       | 33.0                                                                              |      |       | 33.0                                                                                |      |      |
| Actuated g/C Ratio      |       | 0.37                                                                              |      |       | 0.37                                                                              |      |       | 0.42                                                                              |      |       | 0.42                                                                                |      |      |
| v/c Ratio               |       | 0.86                                                                              |      |       | 0.32                                                                              |      |       | 0.68                                                                              |      |       | 0.87                                                                                |      |      |
| Control Delay           |       | 47.2                                                                              |      |       | 22.3                                                                              |      |       | 26.4                                                                              |      |       | 34.7                                                                                |      |      |
| Queue Delay             |       | 0.0                                                                               |      |       | 0.0                                                                               |      |       | 0.0                                                                               |      |       | 0.0                                                                                 |      |      |
| Total Delay             |       | 47.2                                                                              |      |       | 22.3                                                                              |      |       | 26.4                                                                              |      |       | 34.7                                                                                |      |      |
| LOS                     |       | D                                                                                 |      |       | C                                                                                 |      |       | C                                                                                 |      |       | C                                                                                   |      |      |
| Approach Delay          |       | 47.2                                                                              |      |       | 22.3                                                                              |      |       | 26.4                                                                              |      |       | 34.7                                                                                |      |      |
| Approach LOS            |       | D                                                                                 |      |       | C                                                                                 |      |       | C                                                                                 |      |       | C                                                                                   |      |      |
| Queue Length 50th (ft)  |       | 151                                                                               |      |       | 53                                                                                |      |       | 113                                                                               |      |       | 207                                                                                 |      |      |
| Queue Length 95th (ft)  |       | #504                                                                              |      |       | 167                                                                               |      |       | 290                                                                               |      |       | #547                                                                                |      |      |
| Internal Link Dist (ft) |       | 684                                                                               |      |       | 892                                                                               |      |       | 1975                                                                              |      |       | 1473                                                                                |      |      |
| Turn Bay Length (ft)    |       |                                                                                   |      |       |                                                                                   |      |       |                                                                                   |      |       |                                                                                     |      |      |
| Base Capacity (vph)     |       | 488                                                                               |      |       | 657                                                                               |      |       | 772                                                                               |      |       | 1013                                                                                |      |      |
| Starvation Cap Reductn  |       | 0                                                                                 |      |       | 0                                                                                 |      |       | 0                                                                                 |      |       | 0                                                                                   |      |      |
| Spillback Cap Reductn   |       | 0                                                                                 |      |       | 0                                                                                 |      |       | 0                                                                                 |      |       | 0                                                                                   |      |      |
| Storage Cap Reductn     |       | 0                                                                                 |      |       | 0                                                                                 |      |       | 0                                                                                 |      |       | 0                                                                                   |      |      |
| Reduced v/c Ratio       |       | 0.86                                                                              |      |       | 0.32                                                                              |      |       | 0.49                                                                              |      |       | 0.63                                                                                |      |      |

#### Intersection Summary

Area Type: Other

Cycle Length: 100

Actuated Cycle Length: 78

Natural Cycle: 90

Control Type: Actuated-Uncoordinated

Maximum v/c Ratio: 0.87

Intersection Signal Delay: 34.4

Intersection LOS: C

Intersection Capacity Utilization 81.0%

ICU Level of Service D

Analysis Period (min) 15

# 95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

Splits and Phases: 3: Chestnut Street & Elliot Street



| Lane Group              | SEL   | SET                                                                               | SER                                                                               | NWL   | NWT                                                                               | NWR  | NEL                                                                               | NET                                                                               | NER  | SWL   | SWT                                                                                 | SWR  | Ø3   |
|-------------------------|-------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-------|-----------------------------------------------------------------------------------|------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|------|-------|-------------------------------------------------------------------------------------|------|------|
| Lane Configurations     |       |  |  |       |  |      |  |  |      |       |  |      |      |
| Traffic Volume (vph)    | 30    | 10                                                                                | 385                                                                               | 40    | 95                                                                                | 5    | 460                                                                               | 385                                                                               | 10   | 5     | 475                                                                                 | 65   |      |
| Future Volume (vph)     | 30    | 10                                                                                | 385                                                                               | 40    | 95                                                                                | 5    | 460                                                                               | 385                                                                               | 10   | 5     | 475                                                                                 | 65   |      |
| Ideal Flow (vphpl)      | 1900  | 1900                                                                              | 1900                                                                              | 1900  | 1900                                                                              | 1900 | 1900                                                                              | 1900                                                                              | 1900 | 1900  | 1900                                                                                | 1900 |      |
| Storage Length (ft)     | 0     |                                                                                   | 50                                                                                | 0     |                                                                                   | 0    | 75                                                                                |                                                                                   | 0    | 0     |                                                                                     | 0    |      |
| Storage Lanes           | 0     |                                                                                   | 1                                                                                 | 0     |                                                                                   | 0    | 1                                                                                 |                                                                                   | 0    | 0     |                                                                                     | 0    |      |
| Taper Length (ft)       | 25    |                                                                                   |                                                                                   | 25    |                                                                                   |      | 25                                                                                |                                                                                   |      | 25    |                                                                                     |      |      |
| Satd. Flow (prot)       | 0     | 1813                                                                              | 1599                                                                              | 0     | 1864                                                                              | 0    | 1805                                                                              | 1891                                                                              | 0    | 0     | 1863                                                                                | 0    |      |
| Flt Permitted           |       | 0.605                                                                             |                                                                                   |       | 0.888                                                                             |      | 0.272                                                                             |                                                                                   |      |       | 0.997                                                                               |      |      |
| Satd. Flow (perm)       | 0     | 1130                                                                              | 1557                                                                              | 0     | 1670                                                                              | 0    | 516                                                                               | 1891                                                                              | 0    | 0     | 1858                                                                                | 0    |      |
| Right Turn on Red       |       |                                                                                   | No                                                                                |       |                                                                                   | No   |                                                                                   |                                                                                   | Yes  |       |                                                                                     | Yes  |      |
| Satd. Flow (RTOR)       |       |                                                                                   |                                                                                   |       |                                                                                   |      |                                                                                   | 2                                                                                 |      |       | 8                                                                                   |      |      |
| Link Speed (mph)        |       | 30                                                                                |                                                                                   |       | 30                                                                                |      |                                                                                   | 30                                                                                |      |       | 30                                                                                  |      |      |
| Link Distance (ft)      |       | 624                                                                               |                                                                                   |       | 387                                                                               |      |                                                                                   | 508                                                                               |      |       | 531                                                                                 |      |      |
| Travel Time (s)         |       | 14.2                                                                              |                                                                                   |       | 8.8                                                                               |      |                                                                                   | 11.5                                                                              |      |       | 12.1                                                                                |      |      |
| Confl. Peds. (#/hr)     | 4     |                                                                                   | 4                                                                                 | 4     |                                                                                   | 4    | 4                                                                                 |                                                                                   | 3    | 3     |                                                                                     | 4    |      |
| Confl. Bikes (#/hr)     |       |                                                                                   |                                                                                   |       |                                                                                   |      |                                                                                   |                                                                                   |      |       |                                                                                     | 2    |      |
| Peak Hour Factor        | 0.92  | 0.92                                                                              | 0.92                                                                              | 0.92  | 0.92                                                                              | 0.92 | 0.92                                                                              | 0.92                                                                              | 0.92 | 0.92  | 0.92                                                                                | 0.92 |      |
| Heavy Vehicles (%)      | 1%    | 1%                                                                                | 1%                                                                                | 0%    | 0%                                                                                | 0%   | 0%                                                                                | 0%                                                                                | 0%   | 0%    | 0%                                                                                  | 0%   |      |
| Shared Lane Traffic (%) |       |                                                                                   |                                                                                   |       |                                                                                   |      |                                                                                   |                                                                                   |      |       |                                                                                     |      |      |
| Lane Group Flow (vph)   | 0     | 44                                                                                | 418                                                                               | 0     | 151                                                                               | 0    | 500                                                                               | 429                                                                               | 0    | 0     | 592                                                                                 | 0    |      |
| Turn Type               | Perm  | NA                                                                                | pm+ov                                                                             | Perm  | NA                                                                                |      | D,P+P                                                                             | NA                                                                                |      | Perm  | NA                                                                                  |      |      |
| Protected Phases        |       | 4                                                                                 | 1                                                                                 |       | 4                                                                                 |      | 1                                                                                 | 1 2                                                                               |      |       | 2                                                                                   |      | 3    |
| Permitted Phases        | 4     |                                                                                   | 4                                                                                 | 4     |                                                                                   |      | 2                                                                                 |                                                                                   |      | 2     |                                                                                     |      |      |
| Detector Phase          | 4     | 4                                                                                 | 1                                                                                 | 4     | 4                                                                                 |      | 1                                                                                 | 1 2                                                                               |      | 2     | 2                                                                                   |      |      |
| Switch Phase            |       |                                                                                   |                                                                                   |       |                                                                                   |      |                                                                                   |                                                                                   |      |       |                                                                                     |      |      |
| Minimum Initial (s)     | 9.0   | 9.0                                                                               | 7.0                                                                               | 9.0   | 9.0                                                                               |      | 7.0                                                                               |                                                                                   |      | 6.0   | 6.0                                                                                 |      | 4.0  |
| Minimum Split (s)       | 14.0  | 14.0                                                                              | 12.0                                                                              | 14.0  | 14.0                                                                              |      | 12.0                                                                              |                                                                                   |      | 11.0  | 11.0                                                                                |      | 19.0 |
| Total Split (s)         | 15.0  | 15.0                                                                              | 22.0                                                                              | 15.0  | 15.0                                                                              |      | 22.0                                                                              |                                                                                   |      | 34.0  | 34.0                                                                                |      | 19.0 |
| Total Split (%)         | 16.7% | 16.7%                                                                             | 24.4%                                                                             | 16.7% | 16.7%                                                                             |      | 24.4%                                                                             |                                                                                   |      | 37.8% | 37.8%                                                                               |      | 21%  |
| Yellow Time (s)         | 4.0   | 4.0                                                                               | 4.0                                                                               | 4.0   | 4.0                                                                               |      | 4.0                                                                               |                                                                                   |      | 4.0   | 4.0                                                                                 |      | 4.0  |
| All-Red Time (s)        | 1.0   | 1.0                                                                               | 1.0                                                                               | 1.0   | 1.0                                                                               |      | 1.0                                                                               |                                                                                   |      | 1.0   | 1.0                                                                                 |      | 0.0  |
| Lost Time Adjust (s)    |       | 0.0                                                                               | 0.0                                                                               |       | 0.0                                                                               |      | 0.0                                                                               |                                                                                   |      |       | 0.0                                                                                 |      |      |
| Total Lost Time (s)     |       | 5.0                                                                               | 5.0                                                                               |       | 5.0                                                                               |      | 5.0                                                                               |                                                                                   |      |       | 5.0                                                                                 |      |      |
| Lead/Lag                | Lag   | Lag                                                                               | Lead                                                                              | Lag   | Lag                                                                               |      | Lead                                                                              |                                                                                   |      | Lag   | Lag                                                                                 |      | Lead |
| Lead-Lag Optimize?      |       |                                                                                   |                                                                                   |       |                                                                                   |      |                                                                                   |                                                                                   |      |       |                                                                                     |      |      |
| Recall Mode             | Min   | Min                                                                               | Max                                                                               | Min   | Min                                                                               |      | Max                                                                               |                                                                                   |      | Max   | Max                                                                                 |      | None |
| Act Effect Green (s)    |       | 9.9                                                                               | 27.0                                                                              |       | 9.9                                                                               |      | 46.4                                                                              | 51.5                                                                              |      |       | 29.3                                                                                |      |      |
| Actuated g/C Ratio      |       | 0.13                                                                              | 0.36                                                                              |       | 0.13                                                                              |      | 0.62                                                                              | 0.69                                                                              |      |       | 0.39                                                                                |      |      |
| v/c Ratio               |       | 0.30                                                                              | 0.73                                                                              |       | 0.68                                                                              |      | 0.81                                                                              | 0.33                                                                              |      |       | 0.81                                                                                |      |      |
| Control Delay           |       | 37.3                                                                              | 29.2                                                                              |       | 50.2                                                                              |      | 23.8                                                                              | 6.7                                                                               |      |       | 32.0                                                                                |      |      |
| Queue Delay             |       | 0.0                                                                               | 0.0                                                                               |       | 0.0                                                                               |      | 0.0                                                                               | 0.0                                                                               |      |       | 0.0                                                                                 |      |      |
| Total Delay             |       | 37.3                                                                              | 29.2                                                                              |       | 50.2                                                                              |      | 23.8                                                                              | 6.7                                                                               |      |       | 32.0                                                                                |      |      |
| LOS                     |       | D                                                                                 | C                                                                                 |       | D                                                                                 |      | C                                                                                 | A                                                                                 |      |       | C                                                                                   |      |      |
| Approach Delay          |       | 29.9                                                                              |                                                                                   |       | 50.2                                                                              |      |                                                                                   | 15.9                                                                              |      |       | 32.0                                                                                |      |      |
| Approach LOS            |       | C                                                                                 |                                                                                   |       | D                                                                                 |      |                                                                                   | B                                                                                 |      |       | C                                                                                   |      |      |
| Queue Length 50th (ft)  |       | 17                                                                                | 130                                                                               |       | 63                                                                                |      | 81                                                                                | 54                                                                                |      |       | 214                                                                                 |      |      |
| Queue Length 95th (ft)  |       | 58                                                                                | #395                                                                              |       | #189                                                                              |      | #386                                                                              | 191                                                                               |      |       | #549                                                                                |      |      |
| Internal Link Dist (ft) |       | 544                                                                               |                                                                                   |       | 307                                                                               |      |                                                                                   | 428                                                                               |      |       | 451                                                                                 |      |      |
| Turn Bay Length (ft)    |       |                                                                                   | 50                                                                                |       |                                                                                   |      | 75                                                                                |                                                                                   |      |       |                                                                                     |      |      |
| Base Capacity (vph)     |       | 153                                                                               | 574                                                                               |       | 226                                                                               |      | 617                                                                               | 1305                                                                              |      |       | 733                                                                                 |      |      |
| Starvation Cap Reductn  |       | 0                                                                                 | 0                                                                                 |       | 0                                                                                 |      | 0                                                                                 | 0                                                                                 |      |       | 0                                                                                   |      |      |
| Spillback Cap Reductn   |       | 0                                                                                 | 0                                                                                 |       | 0                                                                                 |      | 0                                                                                 | 0                                                                                 |      |       | 0                                                                                   |      |      |
| Storage Cap Reductn     |       | 0                                                                                 | 0                                                                                 |       | 0                                                                                 |      | 0                                                                                 | 0                                                                                 |      |       | 0                                                                                   |      |      |
| Reduced v/c Ratio       |       | 0.29                                                                              | 0.73                                                                              |       | 0.67                                                                              |      | 0.81                                                                              | 0.33                                                                              |      |       | 0.81                                                                                |      |      |

#### Intersection Summary

Area Type: Other

Cycle Length: 90

Actuated Cycle Length: 74.6

Natural Cycle: 90

Control Type: Semi Act-Uncoord

Maximum v/c Ratio: 0.81

Intersection Signal Delay: 25.8

Intersection LOS: C

Intersection Capacity Utilization 81.5%

ICU Level of Service D

Analysis Period (min) 15

# 95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

Splits and Phases: 17: Centre Street & Walnut Street

| Ø1                                                                                  | Ø2                                                                                  | Ø3                                                                                   | Ø4                                                                                    |
|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|
|  |  |  |  |
| 22 s                                                                                | 34 s                                                                                | 19 s                                                                                 | 15 s                                                                                  |
| Lanes, Volumes, Timings                                                             |                                                                                     |                                                                                      |                                                                                       |
| VHB/MSD                                                                             |                                                                                     |                                                                                      |                                                                                       |

## Appendix B

- Shared Parking Analysis











## Memorandum

To: Mr. Barney Heath  
Director of Planning

Date: October 12, 2018

Project #: 12239.00

From: VHB, Inc.

Re: The Northland Newton Development  
Right-Sized Parking

This memorandum presents an evaluation of the parking for the proposed mixed-use development project on Needham Street. One of the project design goals is to reduce reliance on personal automobile use. Parking management is an effective tool in influencing travel behavior. Right-sizing the parking supply balances the parking needs of the project while minimizing not only the physical footprint of parking, but also the number of motor vehicle trips that excess parking can incentivize.

The objective of this evaluation is to understand how to minimize the amount of parking while meeting the needs of the project residents, workers, customers, and visitors. The evaluation looks at opportunities for sharing parking among uses that have peak parking demand occurring at different times of day and days of the week.

### Project Description

The project consists of reuse of the mill building at 156 Oak Street as office space and new construction of residential and commercial space. The expected or possible uses within the project consist of the following.

- 822 residential units
- 180,000 of office space
- 105,200 SF of retail space
- 50,000 SF of restaurant space<sup>1</sup>
- 10,000 SF of medical office<sup>1</sup>
- 20,000 SF of health club<sup>1</sup>
- 4,000 SF of community space

### Zoning Requirements

The parking-related Development Standards (Article 5) in Newton's zoning ordinance set forth the minimum number of parking stalls to be supplied for each type of building or land use. The Development Standards also acknowledge that lesser parking is needed when there are multiple uses. The Development Standards include the ability to reduce parking requirements in cases "of a combination, in a single integrated development, of 3 or more uses ...".

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<sup>1</sup> These allocations of restaurant, medical and health club uses are likely to be high in each case but are presented to create an expected "worst case" scenario regarding commercial parking demand.

**Table 1** shows the minimum parking requirements for each individual use and the number of parking spaces based on those requirements. The gross parking requirement, without consideration of shared parking or other parking management strategies, is 3,409 spaces.

**Table 1 – Parking Requirements per Zoning – Standalone Uses**

| Use            | Size          | Parking Ratio per Zoning                                                             | No. of Spaces |
|----------------|---------------|--------------------------------------------------------------------------------------|---------------|
| Residential    | 822 units     | 2 spaces per unit                                                                    | 1,644         |
| Retail         | 105,200 sf *  | 1 space per 300 sf, plus 1 per every 3 employees in largest shift                    | 417           |
| Restaurant     | 50,000 sf **  | 1 space per 3 patron seats, plus 1 per every 3 employees in largest shift            | 581           |
| Medical Office | 10,000 sf     | 5 spaces per 1,000 sf                                                                | 50            |
| Health Club    | 20,000 sf *** | 1 space per 150 sf, plus 1 per every 3 employees in largest shift                    | 142           |
| Office         | 180,000 sf    | 4.0 spaces per 1,000 sf for first 20,000 sf, plus 3.0 per 1,000 sf for additional sf | 560           |
| Community      | 4,000 sf **** | 1 space per 300 sf, plus 1 per every 3 employees in largest shift                    | <u>15</u>     |
|                |               |                                                                                      | <b>3,409</b>  |

\* Estimated 200 employees

\*\* Estimated 1,595 seats and 148 employees

\*\*\* Estimated 24 employees

\*\*\*\* Estimated 3 employees

## Right-Sized Parking Needs

A mixed-use project such as the proposed development needs less parking than that calculated assuming standalone uses. The amount of parking should be reduced to account for several factors, including typical vacancies, the sharing of parking among different uses, and incentives to reduce commuting by personal automobile. It is important to account for these factors and “right-size” the site parking not only to minimize the land and building area used for parking, but also to prevent excess parking from encouraging unnecessary vehicle use.

Two key elements of the parking management strategy are providing only one parking space per dwelling unit and providing a large centralized parking area shared among a variety of users.

## Residential Parking

Parking for residents of the project would average one parking space for each of the 822 dwelling units. This is consistent with the target metric of one car per household set in the *Newton 2040* transportation strategy<sup>2</sup> and reflects general trends towards lower automobile ownership as access expands for other transportation options such as bicycling, transit, and on-demand ride services. Also, Northland expects to charge separately for residential parking to create disincentives for car ownership.

## Shared Parking

The Building 6 parking garage will contain approximately 1,125 parking spaces. It will be the primary parking location for office employees (Building 1) and for retail customers and employees. Sharing this common parking supply allows the amount of parking to be reduced as, for example, restaurant and retail use peaks on evenings and weekends when office use is low.

**Table 2** shows the overall peak parking demand for the project, assuming parking is shared among commercial uses. Results are summarized for the peak parking demand on weekdays and weekends. The project's peak parking demand is 1,884 spaces and occurs on weekdays.

**Table 2 – Peak Parking Demand – Shared Parking**

| Use                     | Size       | Shared Parking Demand<br>(weekday midday) | Shared Parking Demand<br>(weekend evening) |
|-------------------------|------------|-------------------------------------------|--------------------------------------------|
| Residential (reserved*) | 822 units  | 822                                       | 822                                        |
| Retail                  | 105,200 sf | 312                                       | 337                                        |
| Restaurant              | 50,000 sf  | 262                                       | 528                                        |
| Medical Office          | 10,000 sf  | 44                                        | 0                                          |
| Health Club             | 20,000 sf  | 77                                        | 100                                        |
| Office                  | 180,000 sf | 352                                       | 3                                          |
| Community               | 4,000 sf   | <u>15</u>                                 | <u>15</u>                                  |
|                         |            | <b>1,884</b>                              | <b>1,805</b>                               |

\* Residential parking areas assumed to be used only by residents and not shared with commercial tenants/visitors/customers.

<sup>2</sup> *Newton 2040: A Transportation Strategy for Newton*

The calculation of the project's shared parking demand follows the methods outlined by the Urban Land Institute (ULI), the National Parking Association (NPA), and the Institute of Transportation Engineers (ITE). The calculation involves several factors, the first of which is to determine whether all of the parking supply can, in fact, be shared. In this case, much of the residential parking is scattered among small garages under residential buildings and would likely require assigning specific users (such as those from a smaller office tenant) if those residential spaces were to be shared with others. Therefore, to be conservative with the parking demand calculation summarized in Table 2, the residential parking is considered to be used only by residential parkers.

The shared parking calculation then takes into account any atypical mode share by users resulting from transportation demand measures. In this case, the automobile mode share for office workers is assumed to be 60 percent, consistent with the analyses of the "robust shuttle service" scenario presented in the traffic analysis. To be conservative, the mode share adjustment is applied only to office workers and not to retail and restaurant workers.

The shared parking calculation also considers trips are wholly internal to the project. For example, some of the retail and restaurant patrons are those who live or work on site and therefore the retail component of the project does not need to provide parking for them since their cars are already parked at the residence or office. For this calculation, an internal capture rate of 20% is used. That is, when parking space usage is at its peak, 20 percent of retail/restaurant patrons are those living or working on site. This adjustment applies to patrons only and not to employees. The 20 percent figure is consistent with that calculated for the traffic assessment.

The last element of the shared parking calculation is consideration of the temporal differences among various parkers. The ULI and ITE provide information about hourly, daily, and monthly parking demand patterns for each of the project uses. The temporal data differentiate between parking occupancy patterns of customers and visitors versus employees.

## **Conclusion**

The analysis of shared parking potential for the project identifies a peak parking need of 1,884 parking spaces. This analysis assumes an upper-range estimate of high-activity parking uses such as restaurants and medical offices, and also assumes that residential parking is not shared with commercial parkers.

The peak parking demand of 1,884 parking spaces is 69 spaces fewer than the proposed parking supply of 1,953 spaces. The difference is less than one half of one percent and the proposed parking supply is appropriate to meet the project's objective of providing for the parking needs of the residents, workers, customers, and visitors without excess parking that encourages more vehicle use.